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Special Issue

SCIENCE, GOD, AND (NON) BELIEF

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Editor's Note

Science, God, and (Non)Belief

The intersection of science and religion has grasped and stimulated the minds and emotions of great thinkers for centuries. In this special, expanded issue of the SKEPTICAL INQUIRER on Science, God, and *(Non)*Belief, we give a number of noted contemporary scholars and writers an opportunity to share their thoughts and perspectives. It's fitting that the issue begins with our own Center for Inquiry's new Declaration in Defense of Science and Secularism, issued in Washington, D.C.

After my brief introduction asking whether the scientific, rationalist viewpoint may be gaining some new respect and leverage, science journalist George Johnson reports on a rip-roaring conference at the Salk Institute, "Beyond Belief: Science, Religion, Reason, and Survival." There, many of these thinkers urged fellow scientists to take a more aggressive stance against unexamined religious belief, while others counseled stronger efforts to tell science's own "creation story"—the one supported by evidence.

Literary scholar Frederick Crews, who has become known as a skewer of postmodern pretensions, leads off the articles with "Follies of the Wise," where he elegantly outlines the epic clash between scientific empiricism and "lore supported only by traditional authority." Molecular biologist Lee M. Silver puts today's current concerns about biotechnology into the perspective of humanity's millennia-long history of generating novel organisms for more efficient production of food. Opponents of modern, gene-modification biotechnology, he finds, while mostly nonreligious in the conventional sense, nevertheless share with believers a fear of violating a transcendent, divine authority. Philosopher Daniel C. Dennett, in a highly personal essay, raises the question of how a confirmed atheist reacts to a life-saving medical operation. Who does he thank, and how does he respond to those who prayed for him? Philosopher of science Michael Ruse also writes very personally, but in a different vein: he laments that scholars who support science and fight creationist pseudoscience are nevertheless divided into two different camps in their attitudes toward religious believers and, worse, make personal attacks on colleagues not in their camp.

An excerpt from a just-published lecture series by the late astronomer Carl Sagan portrays the immensity of the universe revealed by modern science and notes how no religion has ever come close to incorporating such dramatic, inspiring notions. In a unique take on Ann Coulter's uninformed attack on evolution in *Godless*, Peter Olofsson, a mathematical statistician, parodies Coulter's tirades as a hoax, a fake criticism of evolution exposing the foibles of the intelligent design movement. Sociologist Alan Mazur points out the logical inconsistencies and physical absurdities in Genesis, and retired neurology professor David C. Haas examines prayer from the perspective of modern brain science and neurology. Linguist Mark Newbrook looks at a surprising litany of nonstandard claims and fringe-scholarship in linguistics relating to religious matters.

We hope you find these examinations stimulating and enjoyable. We trust you'll let us know.

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CFI Washington Office Opens, Issues Declaration in Defense of Science and Secularism

The effort to call science and reason back to the table in matters of public policy and legislation has received a much-needed boost with the Center for Inquiry-Transnational's "Declaration in Defense of Science and Secularism," released at the opening of the new Office of Public Policy in Washington, D.C.

The office is a response to the increasing influence of religious doctrine on law and policy makers, as well as to the growing public acceptance of supernatural claims and unfounded religious explanations for the natural world. With the office in place in the nation's capital, the Center for Inquiry will reach out to legislators, provide expert testimony before Congress, speak on issues when they are in the public eye, and submit amicus curiae briefs in science and religion cases before the Supreme Court.

The Center for Inquiry, which defends reason, science, and freedom of inquiry, is an umbrella organization that includes the Council for Secular Humanism, publisher of *Free Inquiry*; and the Committee for Skeptical Inquiry, publisher of the SKEPTICAL INQUIRER.

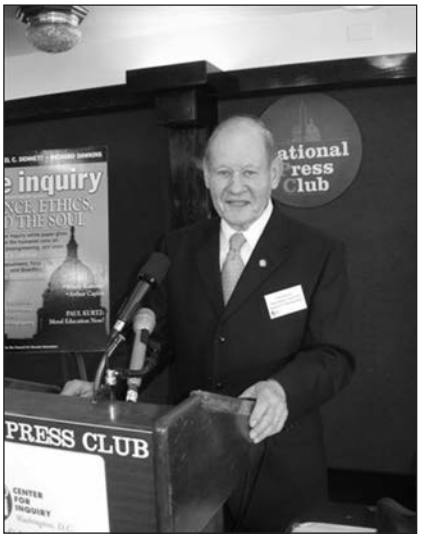
More than 200 people attended the opening of the D.C. office on November 14, including prominent scientists, noted public intellectuals, and Nobel Laureates. The declaration, signed by three Nobel Prize winners and more than fifty scientific supporters, calls on policymakers to put empirical scientific evidence first when determining how to craft legislation.

"We are concerned with the resurgence of fundamentalist religions across the nation and their alliance with political-ideological movements to block science," it reads in part. "We are troubled by the persistence of paranormal and occult beliefs, and by the denial of the findings of scientific research."

The declaration cites roadblocks to stem cell research and contraception education—as well as efforts to teach intelligent design in public-school science classes—as stark examples of how religious influence is promoting the outright dismissal of scientific evidence and medical advances. One of the document's main tenets is to allow and promote free inquiry in all areas of learning, contrary to the current system of censoring potentially life-improving scientific inquiry based on religious concerns.

Speakers at the opening included Paul Kurtz, chairman of the Center for Inquiry/Transnational; David Koepsell, executive director of the Council for Secular Humanism; Edward Tabash, chairman of the First Amendment Task Force; Lawrence M. Krauss, professor of physics and astronomy at Case Western Reserve University; David Helfand, professor of astronomy at Columbia University; and other prominent scientists and intellectuals.

Kurtz emphasized the importance of enacting public policy based on reason and science, and recalled that the historical betterment of society owes a debt to scientific advances. "The social and scientific progress we take for granted has been advanced by a basic scientific philosophical point of view: scientific naturalism," Kurtz said. "The methods of the sciences, and the assumptions upon which they are based, are being challenged culturally in the United States today as never before. Despite its success in providing us with unparalleled benefits, religious fundamentalists seek to inhibit free inquiry and to misrepresent



CFI Chairman Paul Kurtz announces the "Declaration in Defense of Science and Secularism" at the D.C. office.

Participants in CFI's Washington event, from left: back row, Toni Van Pelt, Paul Kurtz, Ronald A. Lindsay; front row, Lawrence Krauss, David Helfand, and Paul Boyer

At its inaugural press conference on November 14, the newly established Washington, D.C., office of the Center for Inquiry released the text of this "Declaration in Defense of Science and Secularism." The Declaration is endorsed by more than fifty prominent scientists and scholars.

DECLARATION IN DEFENSE OF SCIENCE AND SECULARISM

We are deeply concerned about the ability of the United States to confront the many challenges it faces, both at home and abroad. Our concern has been compounded by the failure exhibited by far too many Americans, including influential decision-makers, to understand the nature of scientific inquiry and the integrity of empirical research. This disdain for science is aggravated by the excessive influence of religious doctrine on our public policies.

We are concerned with the resurgence of fundamentalist religions across the nation, and their alliance with political-ideological movements to block science. We are troubled by the persistence of paranormal and occult beliefs, and by the denial of the findings of scientific research. This retreat into mysticism is reinforced by the emergence in universities of "post-modernism," which undermines the objectivity of science.

These disturbing trends can be illustrated by the push for intelligent design (a new name for creationism) and the insistence that it be taught along with evolution. Some thirty-seven states have considered legislation to mandate this. This is both troubling and puzzling since the hypotheses and theories of evolution are central to modern science. The recent federal court decision in the Dover, Pennsylvania, case has set back, but not defeated, these efforts. Moreover, the resilience of anti-evolution movements is supported not only by religious dogmatism but also by the abysmal public ignorance of basic scientific principles. Consider these facts:

- A recent poll by the Pew Research Center revealed that 64% of Americans are open to the idea of teaching intelligent design or creationism in public schools.
- Some 42% totally reject evolution or believe that present forms of life existed since the beginning of time.
- 38% would teach only creationism instead of evolutionary theory.
- Only 26% agree with the predominant scientific view that life evolved by processes of natural selection without the need for divine intervention.
- The percentage of individuals who accept the theory of evolution is lower in the United States than in any other developed country, with the exception of Turkey.

Recent polls have illustrated other instances of scientific illiteracy:

- 20% of Americans think that the Sun revolves about the Earth
- Only 10% know what radiation is
- Less than one-third can identify DNA as a key to heredity
- In the U.S., twelfth grade students scored lower than the average of students in 21 other countries in science and math.

We think that these dismal facts portend a clear and present danger to the role of science in the U.S. In our view it is not enough to teach specific technical subjects—important as that is—but to convey to the public *a general understanding of how science works.* This requires both some comprehension of the methods of scientific inquiry and an understanding of the scientific outlook. The cultivation of critical thinking is essential not only for science but also for an educated citizenry—especially if democracy is to flourish

Unfortunately, not only do too many well-meaning people base their conceptions of the universe on ancient books—such as the Bible and the Koran—rather than scientific inquiry, but politicians of all parties encourage and abet this scientific ignorance. It is vital that the public be exposed to the scientific perspective, and this presupposes the separation of church and state and public policies that are based on secular principles, not religious doctrine. Yet government legislators and executives permit religion, instead of empirical, scientifically supported evidence, to shape public policy. Consider:

- Embryonic stem cell research, which promises to deliver revolutionary therapies, has been needlessly impeded by the misguided claim that the embryo and/or the first division of cells in a petri dish (blastocyst) is the equivalent of a human person. This is rooted in a moral-theological doctrine that has no basis in science.
- The nation spends hundreds of millions of dollars on faith-based programs of unproven efficacy, including ill-advised abstinence-only programs in such areas as drug abuse prevention and sex education, which are more successful at promoting misinformation than abstinence.
- Abstinence policies are advocated abroad and promotion of condom use rejected, heedless of the danger of AIDS and of the need for wise policies aimed to restrain rapid population growth.
- Scientific evidence of global warming is dismissed and the destruction of other species on the planet is ignored, driven by the misguided view that the Earth has been given to the human species as its dominion.

We cannot hope to convince those in other countries of the dangers of religious fundamentalism when religious fundamentalists influence our policies at home; we cannot hope to convince others that it is wrong to compel women to veil themselves when we deliberately draw a veil over scientific knowledge; we cannot hope to convince others of the follies of sectarianism when we give preferential treatment to religious institutions and practices. A mindset fixed in the Middle Ages cannot possibly hope to meet the challenges of our times.

Science transcends borders and provides the most reliable basis for finding solutions to our problems. We maintain that secular, not religious, principles must govern our public policy. This is not an anti-religious viewpoint; it is a scientific

viewpoint. To find common ground, we must reason together, and we can do so only if we are willing to put personal religious beliefs aside when we craft public policy.

For these reasons, we call upon political leaders of all parties:

- to protect and promote scientific inquiry
- to base public policy insofar as possible on empirical evidence instead of religious faith
- to provide an impartial and reliable source of scientific analysis to assist Congress, for example, by reviving the Congressional Office of Technology Assessment
- to maintain a strict separation between church and state and, in particular, not to permit legislation or executive action to be influenced by religious beliefs.

Science and secularism are inextricably linked and both are indispensable if we are to have sound public policies that will promote the common good, not only of Americans but of the global community.

In-agreement signatures, for the Declaration in Defense of Science and Secularism

Baruj Benacerraf, PhD—Nobel Laureate (Physiology and Medicine), Dana-Farber Cancer Institute
Paul Boyer, PhD—Nobel Laureate (Chemistry), Prof. Emer., Univ. of California–Los Angeles
Steven Weinberg, PhD—Nobel Laureate (Physics); Prof. of Physics, Univ. of Texas–Austin
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the tested conclusions of scientific naturalism. This is a highly charged political issue—both science and secularism are under political attack."

Office Policy Director Toni Van Pelt added, "The Center for Inquiry is stepping up and stepping on stage, front and center to bring a rational, secular, pro-democratic influence to the table of national discussion and public policy setting."

Paul Boyer, recipient of the 1997 Nobel Prize in chemistry, said the establishment of the Center for Inquiry and its Office of Public Policy was one step toward a better, and better-informed, future for all Americans. "That goal is an enlightenment that would lead our citizens to base their actions and beliefs on the results of rational inquiry," Boyer said. "Such enlightenment would mean the acceptance of the truth of evolution and would promote changes for better separation of church and state."

Boyer noted that a survey of scientists revealed that those of high achievement are likely to be atheists or agnostics, and the ones who do the most research in biology and other areas that had traditionally been explained by religious mythology were least likely of all to subscribe to religious beliefs.

Ronald A. Lindsay, the legal director of the Washington, D.C., Office of Public Policy, echoed the declaration's call for freedom of inquiry. "One must be committed to the view that public policy should be grounded on nonreligious considerations, and this includes our policies regarding the limits on scientific inquiry," Lindsay said. "It is no accident that, in the Western world, science has flourished after the Enlightenment."

Lindsay said blocking embryonic stem cell research due to the influence of religious opponents needlessly prevents scientists from advancing important work on medical cures. He pointed out that blastocysts, the newly dividing fertilized eggs which are the primary source of embryonic stem cells, cannot be classified as distinct human beings simply because they exist post-fertilization.

"The fact that twinning can occur up to fourteen days after conception establishes

that the early embryo is not a unified, organized individual," he said. "Since there is little dispute that moral rights are assigned to individuals, not groups of cells, this scientific fact should have great significance for the debate over funding of embryonic stem cell research."

Lindsay cited several other examples of how religious beliefs are failing the scientific community, attempting to replace facts with tired myths, and in some cases putting the public unnecessarily at risk.

"This country spends an inordinate amount of money on abstinence-only education programs, despite evidence that these programs promote misinformation about sex more often than they promote abstinence," he said. "(And) many localities and some states continue to have disputes over the teaching of intelligent design. Intelligent design, of course, is nothing more than religious doctrine badly disguised in an ill-fitting scientific dress."

Lindsay and Van Pelt will use their positions in Washington, D.C., to oversee production of objective, nonpartisan analyses of specific issues at the forefront of legislation, and use these reports in lobbying work and litigation that will strive to prevent religious institutions and dogma from shaping public policy.

The specific goals are to:

- Identify sympathetic legislators and forge relationships with them
- Provide experts to give testimony in Congress
- Work on language in related upcoming bills before legislators
- Hold nationally televised press conferences on breaking issues
- Submit amicus curiae briefs in science and religion cases before the Supreme Court

With the Office of Public Policy now open, the Center for Inquiry/Transnational greatly increases the tangibility of its credo, "working to promote and defend reason, science, and freedom of inquiry in all areas of human endeavor."

"At present, some individuals and groups are trying to take small steps away from the shadow of the religious cloak that prevents many from seeing the truth," Boyer said. "Those who have made this possible have my admiration and earnest endorsement."

Notably, the *Washington Post* covered the Office's grand opening and declaration reading November 15 in an article appropriately titled, "Think Tank Will Promote Thinking." It was subtitled "Advocates Want Science, Not Faith, at Core of Public Policy." The Religious News Service sent out a press release worldwide about the event, and PBS-TV featured it as a cover story on *Religion and Ethics Newsweekly* on

Center for Inquiry Launches Naturalism Research Project

The Center for Inquiry/Transnational announces the Naturalism Research Project, a major new effort to develop the theoretical and practical applications of philosophical naturalism, based on science and reason. This project will provide the primary focus of the Center for Inquiry as a research institute. CFI's libraries and research and conference facilities will be available to scientists and scholars working to advance the understanding of science's methodologies and the applications of naturalism.

Philosophical naturalism is a worldview based on reason and science, without appeal to religious mythology or mysticism; it can be intelligently applied to improve the human condition. The need for defending philosophical naturalism has never been greater, as the dogmatic forces of supernaturalism and superstition continue to exert excessive control over humanity. The Center for Inquiry is among the leaders of the crucial intellectual battle against these forces of ignorance and irrationality.

Activities of the Naturalism Research Project will include frequent seminars by visiting scholars, academic conferences, and publications of important research. The central issues of naturalism include the exploration of varieties of naturalism; problems in philosophy of science; the methodologies of scientific inquiry; naturalism and humanism; naturalistic ethics; planetary ethics; and naturalism and the biosciences.

The Naturalism Research Project is directed by John Shook, Vice President for Research, and a former professor of philosophy at Oklahoma State University. Prominent scholars who have joined the Naturalism Research Project's advisory committee include Mario Bunge (philosophy, McGill University), Arthur Caplan (bioethics, University of Pennsylvania), David Chalmers (philosophy, Australian National University), Paul Draper (philosophy, Purdue University), Owen Flanagan (philosophy, Duke University), Philip Kitcher (philosophy, Columbia University), Paul Kurtz (Chairman, Center for Inquiry/Transnational), Valerií Kuvakin (philosophy, Moscow State University), Manuel Paz y Miño (philosophy, San Marcos University, Peru), Steven Pinker (psychology, Harvard University), Huw Price (philosophy, University of Sydney), Hilary Putnam (philosophy, Harvard University), John Searle (philosophy, University of California, Berkeley), Stephen Weinberg (physics, University of Texas), and E.O. Wilson (zoology, Harvard University).

Visiting students and scholars will work with Paul Kurtz, the founder of the Center for Inquiry, and the four senior research fellows presently residing at the Center for Inquiry: John

Shook, a leading scholar on pragmatic naturalism; Joe Nickell of the Committee for Skeptical Inquiry; R. Joseph Hoffmann of the Committee for the Scientific Examination of Religion; and Ibn Warraq, a leading author on Islam. Two other staff philosophers are David Koepsell, executive director of the Council for Secular Humanism and currently holding a visiting fellowship at Yale University; and Austin Dacey, executive director of CFI/New York City and head of CFI's delegation to the United Nations, as an NGO with special consultative status.

The Naturalism Research Project will include the "Resident Fellowship in Naturalism," which will begin in Fall 2007, to be held by a senior scholar conducting research relating to philosophical naturalism. The first large conference of the Naturalism Research Project will be on "The Future of Naturalism," September 20–22, 2007, at CFI headquarters in Amherst. Prominent scholars who will speak include Arthur Caplan (University of Pennsylvania), Adolf Grünbaum (University of Pittsburgh), Isaac Levi (Columbia University), David Rosenthal (NYU), and Ernest Sosa (Brown University).

Future plans for the CFI research center include hosting dozens of scholars each year, using the facility's extensive library and electronic databases. Those scholars will deliver lectures, write for both academic and popular media, and collaborate on numerous interdisciplinary projects. Most important, they will explore improved understandings of scientific methodology, varieties of philosophical naturalism, and rational systems of humanistic ethics. In this vision, the Center for Inquiry hopes to help lead the way toward a "New Enlightenment."

—John Shook

John Shook is Vice President for Research at the Center for Inquiry/Transnational.

Dr. Dino Guilty on All Counts in Tax-Fraud Case, Gets Ten Years

A twelve-person federal jury deliberated for two and a half hours on November 2, 2006, before finding Kent "Dr. Dino" Hovind and his wife, Jo, guilty on all counts in their federal tax-fraud case.

Kent Hovind, flamboyant creationist and founder of Creation Science Evangelism and the Pensacola, Florida-based Dinosaur Adventure Land theme park (see SI, November/December 2004; July/August 2006; and November/December 2006), was found guilty on all fifty-eight charges, including failure to pay employee-related payroll taxes and evading bank-reporting requirements. He faced a maximum of 288 years in prison. Jo Hovind was charged and convicted in forty-four of the counts, also involving evading bank-reporting requirements. She faces a possible 225-year sentence.

On January 19, 2007, Kent Hovind was sentenced to ten years in prison on the federal tax charges. Jo Hovind remained free, pending her March 1 sentencing date. Even before Kent Hovind's sentencing, he had been remanded into custody, as U.S. District Judge Casey Rodgers deemed him a flight risk and "a danger to the community" (the trial revealed that when Hovind's home was initially raided by the IRS in 2004, investigators found piles of cash totaling around $42,000, and six guns, including an SK-S semiautomatic rifle).

The trial, originally scheduled to last five days, lasted over two weeks, after a delay of almost a week due to Jo Hovind's defense attorney Jerry Berringer's illness, and a three-day-long cross-examination of IRS Special Agent Scott Schneider by Kent Hovind's defense attorney, Alan Richey. Schneider led the four-year IRS investigation of the Hovinds. Judge Rodgers admonished Richey several times during the cross-examination for asking irrelevant questions.

The trial phase ended abruptly after the afternoon recess on November 1, when the Hovinds' attorneys both rested their cases without calling any witnesses or presenting any defense. Richey stated that he did not "believe that the government had met its burden [of proof]."

—Greg Martinez

Greg Martinez writes from Gainesville, Florida.

IGNITE THE ADVENTURE

The New Future Fund

"Knowledge is an unending adventure at the edge of uncertainty."

– Jacob Bronowski, scientific polymath

For a more rational tomorrow … and the future of Skeptical Inquirer … please support the new phase of the Center for Inquiry New Future Fund

Across our world, forward-thinking men and women have recognized the scientific paradigm as their surest guide for sound thinking and living. For them knowledge is the greatest adventure. Today the Center for Inquiry movement strives to keep the adventure of knowledge accessible to all. To defend science, reason, freedom of inquiry, and human values in an ever-changing world, we must adopt new methods … new approaches. To realize tomorrow's ambitious goals, we must expand our organization.

The New Future Fund is an audacious, multi-year $26.265 million campaign to fund program needs, capital expansion, and endowment for the Committee for Skeptical Inquiry (CSI) and the Center for Inquiry.

In this new phase the focus turns to:

- Outreach and education: publishing, media relations, personal outreach and more
- Influencing public policy through our new Center in the nation's capital
- Enhancing the Committee for the Scientific Examination of Religion (CSER)
- The Naturalism Research Project: library expansion, research fellowships, and other initiatives to spur exploration of the naturalist tradition
- Transnational Development: reaching beyond borders through the United Nations and direct activism around the globe

As always, the New Future Fund supports new and established programs, including Skeptical Inquirer and CSI's vital media and public education work. Because our work is so vitally important, please make your most generous gift today to support program expansion. By pledging a larger gift over a three-or four-year period, you may find a significant contribution more affordable. Our development staff stands ready to answer questions you may have about asset transfers, planned giving arrangements, and the like. All gifts are fully tax-deductible to the extent allowed by law.

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CFI CENTER FOR INQUIRY

CSI The Committee for Skeptical Inquiry

Toni van Pelt, Paul Kurtz, Ron Lindsay, (seated) Lawrence Krauss, David Helfland, and Nobel Laureate Paul Boyer introduced the Declaration in Defense of Science and Secularism at the inaugural press conference of the Center for Inquiry / Office of Public Policy in Washington, D.C.

Local leaders, campus activists, and students from around the world came together at CFI's 2006 Summer Session.

Latin American and U. S. skeptical activists met at the CFI-sponsored First Iberoamerican Conference on Critical Thinking in Peru.

The new Naturalism Research Project will more than double our library facilities and create a collegial setting for scholarly dialogue and research.

NMSR's Annual Best and Worst Awards for 2006

Editor's note: Each January NMSR Reports*, the newsletter of New Mexicans for Science and Reason (*www.nmsr.org*), publishes its Best & Worst Awards. They're prepared by NMSR President Dave Thomas, a fellow of the Committee for Skeptical Inquiry, and colleagues.*

It's time once again for NMSR's Annual Awards for the year just ended. Here we go!

• The "Just Keeps Going" Award goes to Martin Fleischmann, the once-famous "cold fusion" pioneer, who is now acting as "senior scientific adviser" for D2Fusion, a company claiming to be working on cold fusion-powered home heaters.

• The "Better Late than Never" Award goes to John Humphreys, a British sculptor who once made props for the *Doctor Who* and *Max Headroom* television programs, for confessing to creating the models used in the infamous "alien autopsy" film.

• The "Coolest Connection Between Ancient Egypt and Outer Space" Award goes to physicist Mark Boslough, who appeared on a *National Geographic* television show to explain that a piece of exotic glass found in one of boy pharaoh Tutankhamen's necklaces was most likely formed 29 million years ago, when a large meteor disintegrated above the Libyan desert,

• The "National Lab for Hire" Award to Sandia National Labs, for letting a parade of young-earth creationists promote their pseudoscience and hawk their books in the Steve Schiff Auditorium.

• The "Thanks for Saving Us from Being Total Losers" Award goes to Turkey, the only nation with less acceptance of evolution and more belief in creationism than the United States.

• The "So, How Do You Explain That to the Conspiracy Nuts?" Award goes to NASA, which announced that it had somehow lost the original tape of the first landing on the moon.

• The "Can I Still Orbit as an Independent Candidate?" Award goes to Pluto, the former planet recently downgraded by the International Astronomical Union.

• The "Scientists of America—Unite!" Award goes to Scientists and Engineers for America (Sefora.org), which opposes governmental adoption of unscientific views for ideological reasons.

• The "You Can Stop Freaking Us Out Any Time Now" Award goes to the Bush Administration, for demanding political "reviews" of U.S. Geological Survey reports, for shutting down vital science libraries, for letting Karl Rove misrepresent stem cell research, and much, much more.

• The "Scientific Consensus Is What We Say It Is" Award goes to Senator James Inhofe (R-Oklahoma), who had the government publish his 64-page tract called "A Skeptic's Guide to Debunking Global Warming Alarmism. Hot & Cold Media Spin Cycle: A Challenge To Journalists who Cover Global Warming."

• The "You Dodged a Bullet" Award goes to the Rio Rancho [New Mexico] School Board, which amended its intelligent design-friendly "Science Policy 401," removing creationist-inspired language, and leaving what already exists in state standards.

• The "Better Late than Never II" Award goes to The U.S. Department of Energy, which finally abandoned across-the-board screening of employees with polygraph tests.

• The "Thousands or Billions? Even 288 Years Can Seem Like a Long Time" Award goes to Kent Hovind, the barnstorming young-earth creationist evangelist, for his conviction on fifty-eight counts of federal tax fraud.

• The "Judith Regan of Creationism" Award goes to Ann Coulter, whose book *Godless* included a pathetic rant against evolution.

• The "New Word: Pignorant" Award goes to Jonathan Wells, whose new book *The Politically Incorrect Guide to Darwinism and Intelligent Design* contained so many egregious falsehoods that the scientific critics decided to shorten the phrase "pig ignorant" to simply "pignorant" in order to cope.

• The "Last Nail in The Coffin of ID" Award goes to William Dembski, who absolutely destroyed any remaining credibility intelligent design may have had, when he responded to Judge John E. Jones's powerful ruling of December 2005, not by defending ID in science journals, nor in courts of law, but by parodying the judge's decision with an Internet video that featured animated farting sounds. The Awards Committee had the most trouble with this award, as several members wanted to name it the "Not So Noble Gas" Award. However, all members were agreed that Dembski edged out Wells and Coulter, and did

Sci Fi Investigates, Finds Only Pseudoscience

BENJAMIN RADFORD

Sci Fi Investigates is a recent entry into the paranormal-themed TV lineup. Like others of its ilk such as *Ghost Hunters*, it is a reality show (albeit notably lacking reality) that features investigations into mysterious phenomena. The program, which airs on the Sci Fi (Science Fiction) Channel, tries to distinguish itself as an investigative series: "For the first time ever, a series that doesn't just ponder the questions, it hunts for the answers. From cryptozoology to government conspiracies, *Sci Fi Investigates* will launch a new expedition every episode to aggressively investigate the unexplained phenomena. . . . We will uncover new evidence and subject old evidence to the newest forensic investigative technology for fresh analysis. We will interview eyewitnesses for new insights and recruit the foremost scientists and historians, skeptics and believers to uncover new clues and reveal new perspectives of legendary mysteries."

Despite such breathless claims, the series provides little science and few answers but a lot of unintended skeptical laughs. The program's inability to find explanations is not so mysterious given the lack of scientists and investigators on the show.

The *Sci Fi Investigates* team consists of four principal cast members. A young, attractive blonde named Debbie Dobrydney is identified as "a technician in the identification bureau (Crime Scene/Forensic Unit) of a municipal police department." The paranormal investigator of the bunch is a man named Richard Dolan, who holds degrees in history and writes UFO books. Archaeologist Bill Doleman is the only one in the group who comes close to being a working scientist; he is director of New Mexico's statewide archaeological archive and database, and his research specialties include environmental analysis, prehistoric hunter-gatherers, geological methods in archaeology, computer database design, and statistical analysis. The token skeptic of the group is Rob Mariano, a man with no apparent qualifications beyond having appeared on the reality TV shows *Survivor* and *The Amazing Race*.

Throughout the series, the team's actions bear little resemblance to any sort of real scientific investigation. According to the Merriam-Webster's Collegiate Dictionary, *investigate* means "to study by close examination and systematic inquiry." Judging by the episodes that have aired, the examination is not close, nor is the inquiry systematic. It is instead a hodgepodge of half-baked, unscientific experiments and studies with no clear strategy, purpose, or protocol. It is, in short, pseudoscience.

The team desperately needs the assistance of an actual, working scientist or investigator. With all due respect to the team members, the show's producers can't just assemble a team with little or no investigative experience and expect them to come up with scientifically valid answers to such mysteries.

Their lack of investigation experience is compounded by their overall ignorance of the actual scientific and skeptical investigations into the subjects they examine. Since they don't have years of experience in these subjects, they should at least consult those who do. Yet, with a few ad hoc exceptions, skeptical investigators are notably absent in *Sci Fi Investigates*. To be fair, this is not really the team's fault. If the show's producers had wanted to actually "recruit the foremost scientists and . . . skeptics," they certainly could have done so. Joe Nickell, an expert on several of the topics including Mothman, is nowhere to be found. David E. Thomas, an expert on the Roswell crash, is also absent. And so on.

What's worse, the team members often seem to approach each mystery with a clean slate, apparently having done little or no background research on the subjects they are investigating. This may be done to enhance the appearance of objectivity, but the effect is that they often don't know what to look for.

In one episode, for no apparent reason, the team tries (and fails) to make a convincing fake Bigfoot film. There is no investigative value whatsoever in creating a fake Bigfoot film; even if the team was successful in making a hoax that convinced some people (a difficult and expensive proposition), all it would prove is that that particular film was faked. It says nothing about the various extant films; it was a pointless exercise dreamed up by a TV producer instead of an investigator.

What is perhaps most remarkable about *Sci Fi Investigates* is how little scientific investigation is actually done. As a scientific paranormal investigator with years of experience looking into just such mysteries, I was amused that the team didn't seem to know where to begin.

Benjamin Radford is author or co-author of three books and hundreds of articles on skepticism and the paranormal.

For example, many of their "investigations" consist of simply listening to second- or third-hand stories and anecdotes: Yvonne Brazel tells what her grandfather Mac told *her* about what crashed on his Roswell, New Mexico, ranch in 1947; Gabe Valdez, a former police officer, tells the team about what *he says* were animal mutilations many years earlier and a conspiracy to cover them up.

Incredibly, the team seems to think that simply listening to Valdez's story while looking at photographs of the alleged mutilations is "aggressively investigating the phenomenon," sufficient to come to a conclusion about the mystery. Instead of consulting a veterinarian or pathologist to understand how cattle may appear to be mutilated when they in fact aren't, the team decides that the answers may lie in a secret military base which may or may not exist nearby. The team never checked for themselves Valdez's claim that there were no tracks around the carcasses. Nor did they verify assertions that there were no signs of predation. The investigative team never researched how the "mutilation" marks Valdez reported and photographed can be explained by natural processes.

Without doing any actual investigation, the team concluded that something unexplained was clearly afoot. In a humorous and bizarre non sequitur based entirely on imaginative speculation, team member Rich Dolan states, "What I found most compelling were the photographs of the mutilated animals. No tracks around the carcasses, no signs of predators; they must have been dropped from the air. But who would do such a gruesome thing, and why? Could it be connected to a secret military base?"

But the real skeptical howler comes a little later when Dolan demonstrates his understanding of investigative principles: "Occam's Razor states that the correct explanation of the phenomenon is the least complicated. If I apply that to mutilations, the UFO connection makes some sense."

The team's "investigations" are guided not by any logic, systematic strategy, or investigative acumen but instead by what the TV producers think might look interesting.

Despite the show's premise and promise of professionals hunting for answers, this is amateur armchair investigation at its worst. The show's real danger is that it gives the impression that science and real investigation are being brought to bear on these topics—and failing to explain them.

Some parts of *Sci Fi Investigates* seem to be tongue-in-cheek satire, such as when Rich Dolan and Bill Doleman, searching for the secret military base in a mountain, fly overhead in a small plane looking for heat signatures. Why the pair would use a thermal imaging camera to detect a hidden installation is never explained. Dolan seems baffled by "quite a lot of hot thermal signal" readings, a genuine mystery except for the fact that he is flying over a hot, sunny desert. Of all the ways to find out whether a military base exists in a mountain, this must surely be the most contrived. And what does all this have to do with the cattle mutilations? Who knows? The team's "investigations" are guided not by any logic, systematic strategy, or investigative acumen but instead by what the TV producers think might look interesting.

As a final example, the program's Web site states that "Rob concludes the final group discussion by pointing out that the eyewitness testimony of Bigfoot sightings, something all the team members agree is sincere, can't be explained." The idea that eyewitness testimony regarding Bigfoot, Mothman, or other topics can't be explained is patently false, as I or any number of other experts could have told the *Sci Fi Investigates* team. Ultimately, of course, the program is about entertainment instead of investigation or answers. Which is a shame, because these topics deserve real skeptical inquiry. □

Mysterious Entities of the Pacific Northwest, Part II

In Part I (SI, January/February 2007), Joe Nickell examined claims of two legendary Pacific Northwest creatures, Sasquatch and Cadborosaurus. Part II continues with aliens (including a fresh look at the historic 1947 Arnold "flying saucer" sighting) and ghosts (featuring an on-site investigation of the "haunted" Alaskan Hotel in Juneau.

Aliens

Some assume that UFOs are a modern invention, but since ancient times men have reported seeing strange things in the sky. An increasing interest in air machines no doubt helped promote reports of strange "airships" in the 1890s. After World War I, "the world's first ufologist," Charles Fort, stirred interest in mysterious phenomena, including unidentified objects in the sky that Fort believed indicated visits from space aliens (Clark 1992, 21–23). In the 1920s through the 1940s, science-fiction pulp magazines became popular, especially *Amazing Stories* which debuted in 1929. When its circulation lagged, a new editor, Ray Palmer, boosted sales with wild stories of extraterrestrial visitations and decorated the covers with occasional illustrations of strange, circular spaceships (Baker and Nickell 1992, 186–187, 261–266; Clark 1992, 78).

Joe Nickell is a former private detective and author of numerous investigative books, including Crime Science *and* Real-Life X-Files. *His Web site is at www.joenickell.com.*

Figure 1. The very "haunted" Alaskan Hotel in Juneau is a historic landmark. (Photo by Joe Nickell.)

The term *flying saucers* was coined after a sighting—in the Pacific Northwest—that triggered the modern wave of UFOs. On June 24, 1947, businessman Kenneth Arnold was flying his private airplane over the Cascade Mountains in Washington State when he saw a chain of nine tailless objects streaking south over Mount Baker and heading for Mount Rainier, each flying with a motion like "a saucer skipped across water" (quoted in Ruppelt 1956, 27). The name "flying saucers" was thus born, and Ray Palmer's fiction had become a reality. By the following year, Palmer had helped create *Fate*, a mystery-mongering magazine that promoted UFOs and other "true" mysteries (as it continues to do today) (Clark 1992, 6–8; Nickell 1995, 192; Baker and Nickell 1992, 186–187). Palmer went on to co-author a book with Arnold, *The Coming of the Saucers* (1952).

Skeptics have put forth numerous explanations for Arnold's UFOs: balloons, airplanes, hoaxes, hallucinations, mountain-top mirages, birds, droplets of water on the plane's windshield, etc. (Maccabee 1995; Story 2001, 87–89). Arnold claimed he had viewed the objects carefully, even opening his window and taking off his glasses. He calculated the objects' speed at 1,200 to 1,700 mph, an incredible figure.

Edward J. Ruppelt, former head of the U.S. Air Force's Project Blue Book, which investigated UFOs, wrote of the controversy, noting two factions' arguments at the Air Technical Intelligence Center (ATIC). One side thought Arnold simply saw jet airplanes flying in formation:

> The "Arnold-saw-airplanes" faction maintained that since Arnold said that the objects were 45 to 50 feet long they would have had to be much closer than he had estimated or he couldn't even have seen them at all. Since they were much closer than he estimated, Arnold's timed speed was all wrong and instead of going 1,700 miles per hour the objects were traveling at a speed closer to 400 miles per hour, the speed of a jet. There was no reason to believe they weren't jets. The jets appeared to have a skipping motion because Arnold had looked at them through layers of warm and cold air, like heat waves coming from a hot pavement that cause an object to shimmer. (Ruppelt 1956, 28)

The other faction at ATIC noted Arnold's claim that the UFOs had passed behind one mountain peak, thus supposedly helping establish their correct distance from him. (This faction thus thought the objects must have been about 210 feet long instead of Arnold's estimated 45 to 50 feet [Ruppelt 1956, 28–29]). However, physicist/UFOlogist Dr. Bruce Maccabee (1995, I:15) has noted: "Geological survey maps show that mountain peaks behind which the objects could have disappeared have altitudes of 5,000 to 6,000 feet. Thus it appears that they were lower than 6,000 feet and that Arnold overestimated their altitude." More recently, other evidence has shown that Arnold must have been mistaken about the objects traveling behind a peak (Easton 2000).

Ruppelt himself noted that Arnold's story had been "warped, twisted, and changed" by the "bards of saucerism." He added (1956, 27): "Even some points in Arnold's own account of his sighting as published in his book *The Coming of the Saucers*, do not jibe with what the official files say he told the Air Force in 1947." Moreover, Arnold's sighting is significantly different from that of another alleged eyewitness, one Fred Johnson, a prospector who claimed to have witnessed a string of UFOs when he was in the Cascade Mountains on the same day and at about the same time as Arnold flew over.

Johnson's description of the objects differed significantly from Arnold's in their number and appearance. He reported seeing five or six similar objects, one of which he looked at with his telescope. It was reflective, "oval," an estimated thirty feet in length, and had a pointed end and apparent "tail" (that shifted from side to side). He estimated the objects were about one thousand feet above him (who was then about five thousand feet above sea level), making their altitude approximately six thousand feet. Johnson wrote that the "Last view I got of the objects they were standing on edge Banking in a Cloud,"[1] although Arnold's account implies a cloudless sky.

Even if Johnson's contradictory report is put aside—he may well have been a publicity-seeking false claimant—Arnold's report alone demonstrates that there is no precise set of facts on which to draw a definitive conclusion as to what the "objects" were. It seems plausible that Arnold could have mistaken jet airplanes for unusual flying objects. He himself thought he had seen some newly developed government aircraft (Maccabee 1995, 1:14). However, the Air Force disavowed ownership of the objects.

James Easton (2000) has ventured an explanation that begins with Arnold's obvious distance-size-speed misperceptions and his likening the objects' flight characteristics to "a formation of geese" (Arnold and Palmer 1952, 11). Easton's suspects are the very large American white pelicans, who are among the largest birds in the world, are "highly reflective," fly at high altitudes, and employ a distinctive undulating flying motion, flapping and gliding, that compares well with Arnold's statement that the UFOs "fluttered and sailed" (qtd. in Maccabee 1995, 1:16).

Indeed, not longer after the Arnold-Johnson sightings, on July 2, "a veteran Northwest Airlines pilot who has flown over the Pacific northwest's 'flying saucer' country for 15 years" spotted nine "big round discs weaving northward two thousand feet below us." Capt. Gordon Moore (1947) stated, "We investigated and found they were real all right—real pelicans."

Still, not only UFO proponents but also many skeptics doubt the pelican scenario. I interviewed Major James McGaha (USAF ret.)—a pilot, UFO expert, and director of the Grasslands Observatory in Tucson, Arizona. He thinks a much more likely explanation for Arnold's UFOs (he dismisses Johnson as a probable copycat) is "mountain-top mirages" (see Hendry 1979, 69). McGaha notes that the conditions under which Arnold saw the strange objects—clear skies, smooth air, a potential temperature inversion—were ideal for producing mirage effects. So was the angle of the sun: 50.4 degrees from

McGaha notes that the conditions under which Arnold saw the strange objects—clear skies, smooth air, a potential temperature inversion—were ideal for producing mirage effects.

the horizon. Arnold's insistence that the objects were "flying very close to the mountain tops" and seemingly "swerved in and out of the high mountain peaks" (Arnold and Palmer 1952, 10, 12) is fully consistent with the mirage hypothesis, states McGaha (2006).

In any event, the Arnold case is instructive. The implication of UFO proponents that—because the objects are "unidentified" and the incident "unexplained"—the Arnold sighting is therefore evidence of extraterrestrial visitation is absurd. Not only is such an attitude mystery mongering, but it is also an example of a logical fallacy called arguing from ignorance: One cannot draw a conclusion from a lack of knowledge. The problem is not a failure of science nor of excessive skepticism but rather Arnold's own conflicting versions of what he saw and the serious misperceptions he quite obviously made. Such is often the case with reports of alien sightings.

Ghosts

Spirits of the dead are among the supernatural beings historically encountered by Native Americans. Alaskan Eskimos, according to a Smithsonian ethnography report (Murdoch 1885), often used weapons to fend off ghosts, even carrying a drawn knife for protection when traveling at night. One villager had set up a contrivance to protect his house: it had a dangling cord with a handle, supposedly helping a ghost get inside, but then pulling down on its head a large knife fastened to the wall. In 1883 U.S. Army Lieutenant P.H. Ray witnessed Eskimo villagers at Point Barrow engaged in expelling a ghost from a house. Several women stood at the door, swinging knives and clubs, while people inside worked to chase the ghost outside.

Today, not even weapons, apparently, can rid Juneau's Alaskan Hotel of its ghosts, one of whom was allegedly even created by an angry man's vengeful axe. Built in 1913 as a hotel and bordello (legalized prostitution only ended in 1956), the Alaskan experienced a colorful history before declining (under the name Northlander Hotel, beginning in 1961) and finally being condemned in 1977. It was subsequently restored and, in 1981, placed on the National Register of Historic Places.

In an Eskimo village, several women stood at the door, swinging knives and clubs, while people inside worked to chase the ghost outside.

On May 31, 2006, when our cruise ship made a stopover in Juneau (and I gave a scheduled talk and radio interview), I was able to tour the area courtesy of Michael S. Stekoll, professor of chemistry and biochemistry, University of Alaska Southeast. We stopped to investigate the historic "haunted" hotel, where we were given a tour by owner Bettye Adams and her son Joshua (see figure 1).

The Adamses and their excitable staff report various ghostly goings-on in several rooms of the Alaskan. In number 311, a manager having died there the previous February, staff members believe they can sense a ghostly presence, a subjective impression I was unable to share. Room 313 had yielded a photo by a former resident that showed several "orbs," bright spheres believed by many to be a form of "spirit energy"; actually, however, when they are not mere reflections from shiny surfaces, orbs commonly result from the camera's flash having rebounded from dust particles or water droplets close to the lens (Nickell 2006, 25).

It is room 315, however, that is most discussed, although the phantom habitué is supposedly the same as "the specter in room 321" and elsewhere in the hotel, according to the author of *Haunted Alaska*, Ron Wendt (2002, 71). He elaborates (2002, 73):

> The ghost of the Alaskan Hotel carries a tragic story. In life, she was once the bride of a gold prospector. The man told her he was going to the Haines area to search for gold. He put her up at the Alaskan Hotel and said he would return in three weeks.
>
> When her husband failed to return, the woman became desperate. She was out of money and had nowhere to run. An acquaintance told her there was a way she could support herself, and so she turned to prostitution.
>
> About three months later, the miner returned. When he found out that his wife had been working as a prostitute, he killed her at the hotel.

Although the names of these *dramatis personae* are unrecorded, someone has, somehow, learned the woman's name was Alice and that her husband killed her with "a hatchet" dislodged "from beneath his waistcoat" (Adams 2006, 5–6). But wait: maybe it was really a revolver with which he "shot her dead in that very room"—room 315 (Adams n.d., 56). Sources are also unsure whether the man was really the woman's husband or merely her suitor; they are equally uncertain as to whether he was indeed a miner or instead "captain of his own fishing boat" who "went out to fish and possibly to whale"[2] (Adams n.d., 55).

According to the latter version, inexplicably, while at sea, this captain heard rumors of his girlfriend's infidelity, and attempted to return to Juneau in a storm. According to a version of the story that does not involve murder

(Adams n.d., 55–56):

> Death came quickly to all beneath the turbulent waves, but the man continued, unhindered by flesh. He knocked, bodiless at the door, but none answered. So they say that the man simply stays there, waiting for his love to answer him, right around the time of month that he died.

Or so "they say."

That there are proliferating versions of this story is at once evidence of folklore in the making and reason to be skeptical of its historicity. Its basic folk motifs (or story elements)—involving unfaithfulness, revenge, tragedy, and haunting[3]—persist, even when the factual details are questionable.

Some form of the ghost tale apparently traces back at least to the time the building was called The Northlander Hotel and Marguerite Franklin was owner. She gave a discounted rate on the "haunted" room to a young, poor employee who worked the "graveyard" shift (midnight to eight A.M.). That woman soon reportedly sensed the presence of a "smelly fisherman," even hearing his creaking footsteps and heavy breathing as well as smelling him. She seems to have been an impressionable, possibly even "fantasy-prone," young lady who may have had "waking dreams," which occur in the twilight between being fully asleep or awake (Nickell 1995, 40–42). Or, since she slept during the daytime, one wonders if she might merely have perceived the occasional hotel guest in the hallway. Supposedly the incidents occurred from the 24th to the 30th of each month, but there is no convincing record of such consistency (Adams n.d., 55–56).

As to reported apparitions, those are said to be of the legendary woman-turned-prostitute. States Wendt (2002, 71), "Witnesses have observed her walking down the hall, then simply vanishing from sight." My own investigations as well as research data demonstrates that such experiences often derive from altered states of consciousness, such as when a person is tired or in a relaxed state or performing routine chores, etc. In imaginative individuals a mental image might be superimposed upon the visual scene, sort of a mental double exposure (Nickell 2000, 18).

Certainly, the Alaskan Hotel's ghosts seem to have much in common with those alleged at other "haunted" sites as well as with other mysterious entities—monsters and aliens—of the Pacific Northwest and elsewhere. "Where do entities come from?" asked noted psychologist Robert A. Baker (in an afterword to Nickell 1995, 275). He answered, "from within the human head, where they are produced by the ever-active, image-creating human mind."

Figure 2. Joe Nickell looks for ghosts at the Alaskan Hotel. (Author's photo by Michael S. Stekoll.)

Acknowledgments

In addition to individuals mentioned in the text, I appreciate the assistance of those who helped make the Alaskan cruise a success, notably Toni Van Pelt and Pat Beauchamp. I am also grateful to Susan Fitzgerald and Jeff Brown of KTOO-FM, Juneau. Also, CFI Libraries Director Timothy Binga once again provided valuable research assistance.

Notes

1. Johnson gave two slightly differing and confusing accounts, one briefly written, the other summarized by an FBI agent who interviewed him at the request of the Air Force (Maccabee 1995, 3:6–7). I have attempted to harmonize the two versions. In the second Johnson stated he had a combination watch and compass and that, while the craft flew over, the compass needle oscillated unaccountably.

2. Adams (2006) has also given the conflicting stories as two different incidents, attributing one to room 315, the other to 318.

3. See for example, "Ghosts haunts place of great accident or misfortune" (motif E275), in Thompson 1955, 2:428.

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Is There Such a Thing as Macroevolution?

Even creationists make progress. While young-earth creationists are stuck where science was back in the seventeenth century (most of them do accept the findings of Copernicus and Galileo), an increasing number of them agree that natural selection happens and that it can account for some of the variation found among living organisms in nature (thereby jumping all the way to the middle of the nineteenth century!). However, they hasten to add, this is "just" microevolution, and the real beef is with macroevolution. That, they argue, cannot possibly be explained by Darwinian processes.

I'm afraid that scientists are largely responsible for this misunderstanding and moreover are not doing much to correct it. The words *micro-* and *macro-evolution* do appear in the scientific literature—which, of course, is where creationists got them to begin with. The problem is that evolutionary biologists ever since Darwin (who didn't use those words) have disagreed about where the distinction lies, or whether there even is a distinction at all!

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Most professional biologists today think of microevolution as evolution within species and of macroevolution as what happens over time to differentiate species or "higher" groups of organisms (genera, families, etc.). Darwin would disagree, as he thought that species were just arbitrary boundaries imposed by humans on what is otherwise a seamless continuum of variation. According to Darwin, evolution happens all the time in the same fashion (a theory called *uniformitarianism*, which was first applied by Charles Lyell—who greatly influenced Darwin—to geological processes). Thomas Huxley, "Darwin's bulldog," as he was known for his tenacious defense of evolutionary ideas, disagreed, and admonished Darwin that the hypothesis of gradual and uniform change was simply unnecessary to the theory.

The controversy has raged since, and there is no end in sight. During the 1930s and 1940s, biologists achieved what is now known as the "Modern Synthesis" of evolutionary theory. The synthesis is a unification of classical Darwinism with the (then) new science of genetics, and it is a triumph of twentieth-century science. Yet, even during its early days, it encountered fierce (scientific) critics. Most famously, German geneticist Richard Goldschmidt contended that mutation and natural selection—the fundamental mechanisms of the Darwinian synthesis—do a good job at explaining variation within species but are insufficient when it comes to understanding so-called "evolutionary novelties." Novelties are structures or behaviors that arise from time to time and that often play a major role in the ecological success of the species that carry them. For example, birds evolved from dinosaurs and display the evolutionary novelty of powered flight, a hugely successful trait in terms of the sheer number of species that have it.

Goldschmidt thought that biologists had not yet uncovered the explanatory principles that make evolutionary novelties possible, and creationists have seized on the idea and turned it into annoying mindless mantra like "What good is half an eye?" (The answer, it turns out, is about half as good as a full eye, as we now have a reasonably detailed idea of how eyes repeatedly evolved from simple light receptors.) Goldschmidt's own answer, that genome-wide rearrangements occasionally take place and result in radically different life forms, which he nicknamed "hopeful monsters," was reasonable at the time, but has been shown to be incorrect on empirical grounds (that's the way real science proceeds, of course, as opposed to grand declarations from the pulpit).

Yet, the problem is still with us. I recently returned from a three-day conference at Indiana University on the problem of evolutionary novelties. No creationist there, but little agreement

among the scientists present on what the best explanations are for the appearance of novelties. Some of my more conservative colleagues—like Darwin before them—saw no problem at all, arguing that the conceptual tools of the Modern Synthesis are sufficient for the task and we only need to work out the details. Others, including myself, disagreed and proposed a variety of other venues of inquiry (including somewhat obscure phenomena like phenotypic plasticity, epigenetic inheritance, and emergent complexity).

The important point to understand here is that there is indeed a legitimate scientific debate, but that it has nothing to do with the sort of "debate" that creationists have in mind. None of the participants in the Indiana conference doubts that the Modern Synthesis is the correct account of a large part of biological phenomena. Also, nobody there denied that the answer to the question of evolutionary novelties requires only natural phenomena and is perfectly compatible with all the laws of physics. This isn't a statement of faith, just a common-sense approach that all scientists take and that is known as methodological naturalism, the idea that even if the supernatural exists, it cannot play any role in scientific explanations (because science is, by definition, well, about *nature*).

The reason I think creationists, and the public at large, are not well served by scientists in this case is because few evolutionary biologists talk to the public to begin with, and when they are confronted with the micro/macro question, they simply accuse creationists of making up such a distinction and move on. What they (we) should say is that there is indeed genuine disagreement among professional biologists about the meaningfulness of the concept, and even those who agree that there is something to it are still trying to figure out an explanation.

This, however, wouldn't be an admission of failure but rather a wonderful opportunity to explain to the nonprofessional how science really works. We don't have all the answers (otherwise there would be no point in keeping a host of professional scientists doing research at universities around the globe), and we don't all agree even on where to look for them. Science doesn't have a sacred text to draw ultimate knowledge from, and although we owe much to Darwin's insight and painstaking work, we don't hold him out to be a prophet either. Yes, to explain all of this in a sound bite is difficult, but that's why we give public lectures, write for magazines of wide readership, and produce books. Keeping a constant dialogue with the public is crucial; after all, that's where the money to pay the bills

POINT OF INQUIRY

WITH D.J. GROTHE

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The Incredible Bouncing Cow

One question has long plagued researchers of the paranormal and the unexplained: when aliens return cows after they have finished mutilating them, do the cows bounce when they hit the ground? Now, thanks to the research of noted UFOlogist Linda Moulton Howe, we know that the long-sought answer is *yes*, as established in Howe's ground-breaking paper, "Scientific Data Supports Theory That Mutilated Montana Cow Dropped from Sky and Bounced" (see http://tinyurl.com/yd6urr). Howe's on-site investigation revealed far more than the usual alien slice-and-dice operation on the poor dead animal: "there appeared to be a bounce mark some four to five feet southeast of the dead cow's body. The soil was shoved up against the north side of the mark, suggesting that the 1,300-pound cow had dropped from high enough above to hit the ground with considerable force and bounced to its final resting place with its legs and head pointed north."

Howe submitted soil and barley samples to W.C. Levengood, a biophysicist and PhD-Eq at the Pinelandia Biophysical Laboratory in Grass Lake, Michigan, who specializes in the investigation of crop circles. Levengood measured the "charge density plasma pulses" of the samples (whatever they may be). He found that the greatest "energy change" was about 200 feet south of the cow, and zero "energy" in the bounce mark in the ground. He concluded, "Right at the cow, the energy in the plants were also anomalously low. That would fit in because when the cow hit, the initial impact and second landing, the plant energies were neutralized." Who says that UFOlogy is not scientific? Howe suggests that these "energy changes" might be due to "advanced beam technology," a kind of tractor beam that aliens allegedly use to pick up and return cows, although it would seem that in this case the batteries or whatever powers the tractor beam must have been a bit weak, setting the animal down with a big *thud*. (For more on Levengood's research see "Italian Skeptics Debunk Crop Cir-cle Electromagnetic Radiation Claim," SI, September/October 2005.)

As if this were not sufficiently amazing, the famous animal that started it all, Snippy the Horse, is back in the news after almost forty years. Snippy, a three-year-old mare in Appaloosa, Colorado, became famous in 1967 when her owner, Nellie Lewis, claimed that she had been mutilated by space aliens. Lewis claimed that the dead horse gave off a sweet scent like incense, that its mane burned her fingers, and that the boots she was wearing were later found to be "radioactive." No mention was made as to whether poor Snippy bounced when the aliens dropped her off. The Case of Snippy was investigated and included in the famous Condon Report (Case 32), which concluded in true closed-minded debunker style that "There was no evidence to support the assertion that the horse's death was associated in any way with abnormal causes" (see www.ncas.org/condon/text/case32.htm). Another spoilsport was local veterinarian Wallace Leary, who determined that poor Snippy had been shot twice in the legs with a .22 caliber rifle. This probably would not have killed her, but may well have caused the infection that appears to have left her disabled.

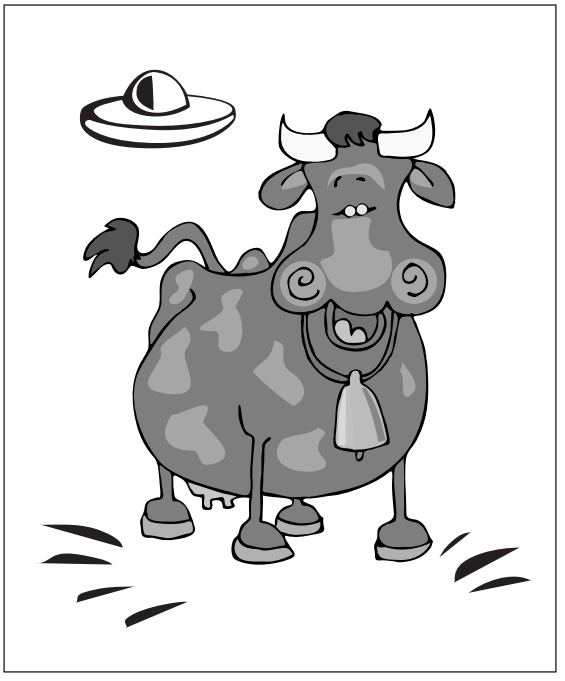
Snippy was the first widely publicized claim of alien mutilation of livestock, and it seems to have started a big trend. Snippy now even has her own Web site (www.snippy.com), which includes a Snippy store selling Snippy merchandise. Recently Snippy's skeleton was offered for sale on eBay, with a minimum bid of $50,000. However, bidding was suspended when ownership of the bones was disputed (see http://tinyurl.com/y3qutv). No mention was made of whether any bids for Snippy's bones were actually received.

As scary as all this animal mutilation talk may be, it's nothing compared to the hunt for the Skinwalker. A new book by Colm Kelleher and George Knapp, *Hunt for the Skinwalker*, tells the chilling tale. Kelleher is a physicist who formerly worked for the now-defunct National Institute for Discovery Sciences (NIDS), funded by Las Vegas billionaire Robert Bigelow. Knapp is a Las Vegas TV personality who has made a name for himself reporting sensational stories about Area 51 and such. When stories about an allegedly haunted ranch in northeastern Utah reached NIDS, Bigelow decided to buy the ranch to further his paranormal research. (The "Skinwalker Ranch" now has its own Wikipedia entry: see http://en.wikipedia.org/wiki/Skinwalker_Ranch).

According to Knapp, "For as long as anyone can remember, this part of

Robert Sheaffer's World Wide Web page for UFOs and other skeptical subjects is at www.debunker.com.

northeastern Utah has been the site of simply unbelievable paranormal activity. UFOs, Sasquatch, cattle mutilations, psychic manifestations, creatures that aren't found in any zoos or textbooks, poltergeist events." He suggests that it may be "the strangest place on Earth." Some observers trace this weirdness back to an old Indian curse that the Navajo supposedly placed on the Utes. As you know, lots of paranormal problems can be traced back to old Indian graveyards or curses; one Indian graveyard in South Park, Colorado, has been particularly troublesome. One anthropologist quoted in the book describes Skinwalker beliefs as follows: "Skinwalkers are purely evil in intent. I'm no expert on it, but the general view is that skinwalkers do all sorts of terrible things—they make people sick, they commit murders. They are grave robbers and necrophiliacs. They are greedy and evil people who must kill a sibling or other relative to be initiated as a skinwalker. They supposedly can turn into were animals and can travel in supernatural ways."



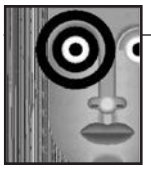
The previous owner of the ranch had reportedly encountered numerous unexplained phenomena, such as a bulletproof wolf that could not be killed, and apparently walked off into thin air. Later, three dogs were zapped by something while chasing blue orbs of light in a pasture. All that was left of each of the dogs was a greasy, butter-like glob.

One of the incidents described in the book occurred in August 1997. Two unnamed researchers were perched on a bluff of the ranch late at night, monitoring a pasture. One of them descended into the pasture to meditate, as he believed that this sometimes "activated the phenomenon." After about two hours, they allegedly spotted a small yellow light a few feet off the ground. They watched as it began to expand. One of them grabbed a pair of Generation III ITT night vision binoculars, while the other reached for a 35mm camera loaded with infrared film. As seen in the binoculars, the light seemed to expand, and take on a tunnel like appearance. At the far end of the tunnel, what started out as an indistinct motion gradually became the head and shoulders of a humanoid creature. It stepped out of the tunnel and walked off into the night. All that remained was the smell of sulphur. Unfortunately, the observer with the camera saw only the circle of light, and doesn't seem to have taken any pictures anyway. Researchers installed cameras atop telephone poles, but they were attacked and disabled by some invisible force. Another golden opportunity for scientific research, lost forever. . . .

As scary as all this Skinwalker stuff is, it's nothing compared to the story now being told by Robert Duncan O'Finioan, who claims to have been "brainwashed, conditioned and controlled as part of a highly classified MKULTRA program called Project Talent," and whose story is now being featured on Jerry Pippin's mystery-mongering Internet broadcasts (www.jerrypippin.com). Of a thousand others allegedly trained as "child warriors" in 1966, he says he is one of only twenty left alive. He was selected, he says, because of his mixed Native American and Celtic heritage; both of those groups supposedly have unique spiritual and mental abilities, so the combination is unbeatable for making a powerful psychic warrior. His top-secret training, which was very abusive and brutal, supposedly gave him "enhanced physical and psychic abilities . . . including the abilities to hurl someone across the room with his mind, and walk through a solid wall." His right arm was "hardwired" with an "enhancer" implant, supposedly giving it "astonishing speed and strength."

Supposedly O'Finioan and eleven other child warriors were flown to Cambodia in 1972 to deliver a "death blow" to Khmer Rouge troops, "using only the combined power of their minds." A helicopter lands, coming to the aid of a platoon of Marines pinned down by hostile fire. Twelve children disembark, form a semicircle, and hold hands. When their hands are raised, the combined psychic force kills every enemy soldier within twenty miles.

Now O'Finioan says he is beginning to recover conscious memories of all these alarming events from his past, which had long been repressed by the mind controllers. When he underwent a recent MRI scan, not only did it detect an implant deep inside his brain, but the implant caused the MRI machine to catch fire, sending doctors and nurses scurrying with fire extinguishers. This also seems to have burned out the implant, effectively freeing him from MKULTRA's control. Unfortunately, none of his remarkable physical abilities are demonstrated on the video *Ultimate Warrior* on Pippin's site, in which O'Finioan simply talks to the camera and doesn't walk through any walls. By way of explanation, he says that most of his paranormal abilities belong to his "alternate personalities," which cannot be brought out on demand. What do his enhanced mental abilities foresee for the future? A giant supervolcano in a western state will rip the U.S. apart, and "very soon." So if this happens, as you're being buried in ashes and debris, remember that you read it here first. □



Male Pregnancy

Q: I came across a news story and Web site about a pregnant man. Can this be true?

E. Reid

A: In the modern world, gender and sexual lines are often blurred. Cross-dressing celebrities and entertainers such as RuPaul and Dame Edna are common, and the public is more aware than ever about homosexuality and transgendered individuals. But how far can the gender lines be pushed? Might biological gender be as fluid as sexual identity? Can men become pregnant?

The main source for information on the question is MalePregnancy.com, a Web site that documents and disseminates news about Mr. Lee Mingwei, the first man to actually become pregnant through amazing medical advances. According to the site, "RYT Hospital-Dwayne Medical Center is synonymous with the world's most innovative and extraordinary healthcare. Through its affiliation with Dwayne University Medical College, RYT Hospital is responsible for the cutting-edge research that leads to the clinical treatments of the future. At RYT, medical possibilities become medical breakthroughs."

On the site, people can peruse Mr. Lee's pregnancy journal, see video archives of the progress of his pregnancy, and even watch a short documentary film on male pregnancy. The site includes testimonials and reactions from people who contacted RYT Hospital and Mr. Lee. A woman named Liz writes, "This is against God. Mr. Lee is a sick man. Repent now before it's too late. You sick, sick people..." Another contributor, Anne, lends support to the project and Mr. Lee: "Go, Mr. Lee! All my prayers and best wishes to you. I'm so happy for you and your baby. . . ."

Mr. Lee and RYT Hospital are aware that their claims are hard to believe, and in their FAQ (frequently asked questions) section, they address skepticism: "Some Web sites have claimed to 'debunk the male pregnancy hoax,' but they're mistaken. This is not a hoax like Orson Welles' *War of the Worlds* [*sic*] broadcast. It's true that many of the people involved in this project (including Mr. Lee) are indeed artists—and Virgil Wong has created an art installation of Male Pregnancy for exhibit at the PaperVeins Museum of Art—but yes, Mr. Lee is really pregnant."

Of course, no, Mr. Lee is *not* pregnant, and he doesn't exist; the Web site is an intricate hoax. According to Alex Boese, author of *Museum of Hoaxes*, the Web site was launched in 1999 by artist Virgil Wong, who claimed that that site was intended to be a sort of hoax performance art. It seems likely that thousands of people were indeed fooled when they went to the Wong Web site—if not fully believing that Mr. Lee would actually give birth at any moment, at least wondering if the whole thing might not be real after all.

There are several reasons why the story seemed superficially credible. Modern medical science can do amazing things, and medical marvels are routinely announced (and oversold) by the news media. With so many real medical breakthroughs, it's not always easy to tell the truth from hoaxes.

Second, the Web site is quite credible, complex, and cleverly designed. It contains links to actual, legitimate news stories that superficially seemed to bolster the idea that men could become pregnant. A CNN news story, for example, discussed how male seahorses actually carry the eggs in a pouch once they are deposited there by a female, then proceeds to fertilize them and carry them to term. In that sense, the male becomes "pregnant." (As do pipefish, both of the *Syngnathidae* family; for more on this, see Adam Jones and John Avise's 2003 article "Male Pregnancy" in *Current Biology* 13[20].)

The pregnant man story gained un-intended credibility and publicity in late 2006 by the publication of a widely disseminated ABC News article (and broadcast of a TV newsmagazine segment) titled "A Pregnant Man?" (available at http://abcnews.go.com/Primetime/story?id=2346476&page=1). The article's headline was deceptive, as the story had nothing to do with a male pregnancy; instead, the piece told of a 36-year-old Indian farmer named Sanju Bhagat who was discovered to have had a parasitic twin in his chest. The only link to any pregnancy was that Bhagat's distended stomach resembled that of a pregnant woman. Still, the unfortunately-titled ABC News story was among the first returns in a Google search on the topic (along with Lee's Web site), lending credibility to some Web surfers who clicked through pages and results without reading too carefully. For better or worse, women still retain the honor and burden of carrying our children.

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Submissions can be sent to: The Skeptical Inquiree, Skeptical Inquirer, P.O. Box 703, Amherst NY 14226 (or bradford@centerforinquiry.net).

Is Science Gaining New Ground?

Introduction

KENDRICK FRAZIER, Editor

The tone and character of the science vs. religion debate, a perennial source of conflict, seems recently to have shifted more in favor of the scientific viewpoint. Some of the extreme forms of fundamentalist activism, at least in the United States, have been muted a bit from their unrestrained aggressiveness of just two years ago. The December 2005 court decision in Dover, Pennsylvania, striking down "intelligent design" as a crude pretender without the slightest scientific validity struck the first serious blow. The scandals several prominent evangelical and political leaders got themselves into this past year further undermined pretensions of their ilk to a higher morality. The November elections unseated from a majority in the House and Senate the party whose Christian right wing encouraged and fomented so many assaults on church-state separation and attacks on good science.

In the public and intellectual arenas, the "god question" was explored with a new and refreshing candor, with rationalist viewpoints gaining some surprising new leverage. Richard Dawkins's *The God Delusion* was a high-toned but forthright skewering of the validity of the very idea of god, any god. It was a best seller. Sam Harris's *Letter to a Christian Nation*, a followup to his *The End of Faith*, shared time on the best seller lists with Dawkins' book. Daniel Dennett (*Breaking the Spell*), Frederick Crews (*Follies of the Wise*), Lee M. Silver (*Challenging Nature: The Clash of Science and Spirituality at the New Frontier of Life*), and the late Carl Sagan (*The Varieties of Scientific Experience: A Personal View of the Search for God*, edited by his widow Ann Druyan) all published books that thoughtfully advanced the perspective of science and reason in regard to religion and much else. The media noticed. *Wired* magazine featured "The New Atheism (No Heaven. No Hell. Just Science)" in a cover article focusing on Dawkins, Dennett, and Harris. *Time* published a "God vs. Science" cover article featuring a private debate about religion between the atheist Dawkins and the believer Francis Collins, both prominent evolutionary scientists. *SEED* magazine's "God vs. Science" cover article featured E.O. Wilson's "big idea"—that a consilience between science and religion can help save the planet's biodiversity.

Science itself advanced still further into the former domains of religion, with a long string of discoveries providing new insights into everything from human evolution to neuroscience. Brain imaging and other laboratory methods continued to find new natural neurophysiological explanations for phenomena and experiences formerly interpretable as mystical or religious. Geneticists and molecular biologists garnered more insights into the molecular instructions that govern life and, through determination and comparison of more organisms' genomes, the continuity and connectivity of all life on Earth, humans included.

All in all, in the West the scientific, rational viewpoint seemed to be given new credence and respect. But whether the ground it has gained can be held—or even is truly new ground or just territory lost during the fundamentalist advances of the past decade or so—remains to be seen. As for the rest of the world, Islamic extremism touting murderous jihad against "infidels" and continued sectarian killings in Iraq and elsewhere showed no gains at all for rationalism.

* * *

This special issue of the SKEPTICAL INQUIRER on science and religion explores all these issues, and many more. As in our past special issues on this subject, you will find perhaps surprising differences of opinion and viewpoints. The intellectual leaders featured here are all strong defenders of science and reason, but their attitudes toward religion and god are markedly different. This diversity, I believe, is healthy. You will find here much to nourish the mind and heart. We welcome your reactions. □

A Free-for-All on Science and Religion

GEORGE JOHNSON

Maybe the pivotal moment came when Steven Weinberg, a Nobel Laureate in physics, warned that "the world needs to wake up from its long nightmare of religious belief," or when a Nobelist in chemistry, Sir Harold Kroto, called for the John Templeton Foundation to give its next $1.5 million prize for "progress in spiritual discoveries" to an atheist—Richard Dawkins, the Oxford evolutionary bio-logist whose book *The God Delusion* is a national best-seller.

Or perhaps the turning point occurred at a more solemn moment, when Neil deGrasse Tyson, director of the Hayden Planetarium in New York City and an adviser to the Bush administration on space exploration, hushed the audience with heartbreaking photographs of newborns misshapen by birth defects—testimony, he suggested, that blind nature, not an intelligent overseer, is in control.

Somewhere along the way, a forum earlier this month [November 2006] at the Salk Institute for Biological Studies in La Jolla, Calif., which might have been one more polite dialogue between science and religion, began to resemble the founding convention for a political party built on a single plank: in a world dangerously charged with ideology, science needs to take on an evangelical role, vying with religion as teller of the greatest story ever told.

Carolyn Porco, a senior research scientist at the Space Science Institute in Boulder, Colo., called, half in jest, for the establishment of an alternative church, with Dr. Tyson, whose powerful celebration of scientific discovery had the force and cadence of a good sermon, as its first minister.

She was not entirely kidding. "We should let the success of the religious formula guide us," Dr. Porco said. "Let's teach our children from a very young age about the story of the universe and its incredible richness and beauty. It is already so much more glorious and awesome—and even comforting—than anything offered by any scripture or God concept I know."

She displayed a picture taken by the Cassini spacecraft of Saturn and its glowing rings eclipsing the Sun, revealing in the shadow a barely noticeable speck called Earth.

There has been no shortage of conferences in recent years, commonly organized by the Templeton Foundation, seeking to smooth over the differences between science and religion and ending in a metaphysical draw. Sponsored instead by the Science Network, an educational organization based in California, and underwritten by a San Diego investor, Robert Zeps (who acknowledged his role as a kind of "anti-Templeton"), the La Jolla meeting, "Beyond Belief: Science, Religion, Reason, and Survival," rapidly escalated into an invigorating intellectual free-for-all. (Unedited video of the proceedings will be posted on the Web at tsntv.org.)

A presentation by Joan Roughgarden, a Stanford University biologist, on using biblical metaphor to ease her fellow Christians into accepting evolution (a mutation is "a mustard seed of DNA") was dismissed by Dr. Dawkins as "bad poetry," while his own take-no-prisoners approach (religious education is "brainwashing" and "child abuse") was condemned by the anthropologist Melvin J. Konner, who said he had "not a flicker" of religious faith, as simplistic and uninformed.

After enduring two days of talks in which the Templeton Foundation came under the gun as smudging the line between science and faith, Charles L. Harper Jr., its senior vice president, lashed back, denouncing what he called "pop conflict books" like Dr. Dawkins's *God Delusion*, as "commercialized ideological scientism"—promoting for profit the philosophy that science has a monopoly on truth.

That brought an angry rejoinder from Richard P. Sloan, a professor of behavioral medicine at Columbia University Medical Center, who said his own book, *Blind Faith: The Unholy Alliance of Religion and Medicine*, was written to counter "garbage research" financed by Templeton on, for example, the healing effects of prayer.

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Richard Dawkins, being shown a book, and Nobel laureate Sir Harold Kroto, standing behind him, were among scientists at the San Diego conference urging efforts to weaken religion's hold on civilization. Kroto called for the Templeton Foundation to give its prize for religion to atheist Dawkins. Photo by Sandy Huffaker for the New York Times; used with permission.

With atheists and agnostics outnumbering the faithful (a few believing scientists, like Francis S. Collins, author of *The Language of God: A Scientist Presents Evidence for Belief,* were invited but could not attend), one speaker after another called on their colleagues to be less timid in challenging teachings about nature based only on scripture and belief. "The core of science is not a mathematical model; it is intellectual honesty," said Sam Harris, a doctoral student in neuroscience and the author of *The End of Faith: Religion, Terror and the Future of Reason* and *Letter to a Christian Nation.*

"Every religion is making claims about the way the world is," he said. "These are claims about the divine origin of certain books, about the virgin birth of certain people, about the survival of the human personality after death. These claims purport to be about reality."

By shying away from questioning people's deeply felt beliefs, even the skeptics, Mr. Harris said, are providing safe harbor for ideas that are at best mistaken and at worst dangerous. "I don't know how many more engineers and architects need to fly planes into our buildings before we realize that this is not merely a matter of lack of education or economic despair," he said.

Dr. Weinberg, who famously wrote toward the end of his 1977 book on cosmology, *The First Three Minutes*, that "the more the universe seems comprehensible, the more it also seems pointless," went a step further: "Anything that we scientists can do to weaken the hold of religion should be done and may in the end be our greatest contribution to civilization."

With a rough consensus that the grand stories of evolution by natural selection and the blossoming of the universe from the Big Bang are losing out in the intellectual marketplace, most of the discussion came down to strategy. How can science fight back without appearing to be just one more ideology?

"There are six billion people in the world," said Francisco J. Ayala, an evolutionary biologist at the University of California, Irvine, and a former Roman Catholic priest. "If we think that we are going to persuade them to live a rational life based on scientific knowledge, we are not only dreaming—it is like believing in the fairy godmother."

"People need to find meaning and purpose in life," he said. "I don't think we want to take that away from them."

Lawrence M. Krauss, a physicist at Case Western Reserve University

known for his staunch opposition to teaching creationism, found himself in the unfamiliar role of playing the moderate. "I think we need to respect people's philosophical notions unless those notions are wrong," he said.

"The Earth isn't 6,000 years old," he said. "The Kennewick man was not a Umatilla Indian." But whether there really is some kind of supernatural being—Dr. Krauss said he was a non-believer—is a question unanswerable by theology, philosophy, or even science. "Science does not make it impossible to believe in God," Dr. Krauss insisted. "We should recognize that fact and live with it and stop being so pompous about it."

That was just the kind of accommodating attitude that drove Dr. Dawkins up the wall. "I am utterly fed up with the respect that we—all of us, including the secular among us—are brainwashed into bestowing on religion," he said. "Children are systematically taught that there is a higher kind of knowledge which comes from faith, which comes from revelation, which comes from scripture, which comes from tradition, and that it is the equal if not the superior of knowledge that comes from real evidence."

By the third day, the arguments had become so heated that Dr. Konner was reminded of "a den of vipers."

"With a few notable exceptions," he said, "the viewpoints have run the gamut from A to B. Should we bash religion with a crowbar or only with a baseball bat?"

His response to Mr. Harris and Dr. Dawkins was scathing. "I think that you and Richard are remarkably apt mirror images of the extremists on the other side," he said, "and that you generate more fear and hatred of science."

Dr. Tyson put it more gently. "Persuasion isn't always 'Here are the facts—you're an idiot or you are not,'" he said. "I worry that your methods"—he turned toward Dr. Dawkins—"how articulately barbed you can be, end up simply being ineffective, when you have much more power of influence."

"Science does not make it impossible to believe in God," Dr. Krauss insisted. "We should recognize that fact and live with it and stop being so pompous about it."

Chastened for a millisecond, Dr. Dawkins replied, "I gratefully accept the rebuke."

In the end it was Dr. Tyson's celebration of discovery that stole the show. Scientists may scoff at people who fall back on explanations involving an intelligent designer, he said, but history shows that "the most brilliant people who ever walked this earth were doing the same thing." When Isaac Newton's *Principia Mathematica* failed to account for the stability of the solar system—why the planets tugging at one another's orbits have not collapsed into the Sun—Newton proposed that propping up the mathematical mobile was "an intelligent and powerful being."

It was left to Pierre Simon Laplace, a century later, to take the next step. Haughtily telling Napoleon that he had no need for the God hypothesis, Laplace extended Newton's mathematics and opened the way to a purely physical theory.

"What concerns me now is that even if you're as brilliant as Newton, you reach a point where you start basking in the majesty of God and then your discovery stops—it just stops," Dr. Tyson said. "You're no good anymore for advancing that frontier, waiting for somebody else to come behind you who doesn't have God on the brain and who says: 'That's a really cool problem. I want to solve it.'"

"Science is a philosophy of discovery; intelligent design is a philosophy of ignorance," he said. "Something fundamental is going on in people's minds when they confront things they don't understand."

He told of a time, more than a millennium ago, when Baghdad reigned as the intellectual center of the world, a history fossilized in the night sky. The names of the constellations are Greek and Roman, Dr. Tyson said, but two-thirds of the stars have Arabic names. The words *algebra* and *algorithm* are Arabic.

But sometime around 1100, a dark age descended. Mathematics became seen as the work of the devil, as Dr. Tyson put it. "Revelation replaced investigation," he said, and the intellectual foundation collapsed.

He did not have to say so, but the implication was that maybe a century, maybe a millennium from now, the names of new planets, stars, and galaxies might be Chinese. Or there may be no one to name them at all.

Before he left to fly back home to Austin, Dr. Weinberg seemed to soften for a moment, describing religion a bit fondly as a crazy old aunt.

"She tells lies, and she stirs up all sorts of mischief and she's getting on, and she may not have that much life left in her, but she was beautiful once," he lamented. "When she's gone, we may miss her."

Dr. Dawkins wasn't buying it. "I won't miss her at all," he said. "Not a scrap. Not a smidgen." □

Follies of the Wise

The human penchant for disastrously confusing fantasy with fact is most plainly seen in the impulse to ascribe one's own concerns to divine powers and then to harden one's heart against unbelievers.

FREDERICK CREWS

Gerald Fried

On the day after Christmas 2004, a major earthquake and tsunami devastated coastal regions around the Indian Ocean, killing as many as 300,000 people outright, and dooming countless others to misery, heartbreak, and early death. Thanks to video cameras and the satellite transmission of images, that event penetrated the world's consciousness with an immediate force that amounted, psychologically, to a tsunami in its own right. The charitable contributions that then poured forth on an unprecedented scale expressed something more than empathy and generosity. They also bore an aspect of self-therapy—of an attempt, however symbolic, to mitigate the calamity's impersonal randomness and thus to draw a curtain of decorum over a scene that appeared to proclaim too baldly, "This world wasn't made for us." No greater challenge to theodicy—the body of doctrine that attempts to reconcile cruelty, horror, and injustice with the idea of a benevolent God—had been felt by Western pundits since the great Lisbon earthquake and tsunami of November 1, 1755.

On that earlier occasion, mainstream Catholic and Protestant faith received a lesser blow than did Enlightenment "natural theology," which, presuming the Creator to have had our best interests at heart when he instituted nature's laws and then retired, made no allowance for either Satanic influence or divine payback for wickedness. God's indifference, it then suddenly appeared to Voltaire and others, was more complete than any deist had dared to conceive. As for the clerics of the era, they welcomed the disaster with unseemly *Schadenfreude* as a useful topic for sermons. "Learn, O Lisbon," one Jesuit intoned, "that the destroyers of our houses, palaces, churches, and convents, the cause of the death of so many people and of the flames that devoured such vast treasures, are your abominable sins, and not comets, stars, vapors, and exhalations, and similar natural phenomena" (Wieseltier 2005, p. 34).

The same opportunity was seized in early 2005 by Hindu, Muslim, Christian, and even Buddhist fear mongers, and they were joined by, among others, Israel's Sephardic chief rabbi, who proclaimed, "this is an expression of God's great ire with the world" (Wieseltier 2005). But two and a half centuries of increasing scientific awareness had made for a significant difference in lay attitudes. Now the rabbi's callous words—Leon Wieseltier rightly called them "a justification of the murder of children"—met with widespread revulsion. By 2005 only an unschooled person or a blinkered zealot could fail to understand that a thoroughly natural conjunction of forces had wiped out populations whose only "sin" was to have pursued their livelihood or recreation in lowlands adjacent to the ocean.

Theodicy, in this altered climate of opinion, would have to take a subtler track. Just such an adjustment was made with considerable suavity by the Archbishop of Canterbury, Rowan Williams, in a *Sunday Telegraph* article of January 2, 2005:

> The question: "How can you believe in a God who permits suffering on this scale?" is . . . very much around at the moment, and it would be surprising if it weren't—indeed, it would be wrong if it weren't. The traditional answers will get us only so far. God, we are told, is not a puppet-master in regard either to human actions or to the processes of the world. If we are to exist in an environment where we can live lives of productive work and consistent understanding—human lives as we know them—the world has to have a regular order and pattern of its own. Effects follow causes in a way that we can chart, and so can make some attempt at coping with. So there is something odd about expecting that God will constantly step in if things are getting dangerous (Williams 2005, p. 22).

Thanks to the *Sunday Telegraph*'s provocative headline, "Of Course This Makes Us Doubt God's Existence," Williams's opinion piece raised many an eyebrow, enhancing the archbishop's well-cultivated reputation for theological brinkmanship. On a careful reading, however, his essay appears in a truer light as a traditional exercise in Christian damage control. "Doubt God's existence"? Hardly. It sufficed for Williams that "we are told" about the Lord's plan to allow the world "a pattern of its own"—one that, if it occasionally puts us in harm's way, does so only because the fashioning of a law-abiding cosmos struck the Almighty as the best means for us humans to achieve "productive work and consistent understanding." A more complacent expression of anthropocentric vanity would be hard to imagine.

Having made a conciliatory feint toward heretical thoughts, the prelate went on to slam the door on unbelievers by suggesting that only "religious people" can care about the loss of individual lives within a mass die-off. Through their prayers, Williams related, pious folk "ask for God's action" to assuage the suffering of the maimed and the bereaved. Wait—hadn't the writer just conceded that it's useless to plea for any intervention against nature's laws? That point, we now realize, was only a rhetorical stratagem for exempting the recent tsunami from inclusion among motivated supernatural deeds. The God who had been paring his fingernails when the hundred-foot waves came ashore was now presumably back at his post and ready to be swayed by spoken and silent prayers that would waft toward heaven, even though they lacked any known physical means of doing so.

The point of Williams's essay was not to question theology but to reassert it in the face of other people's misgivings. Viewed from the archbishop's interested angle, the upheaval of earth and ocean served as a trial of faith whose outcome was assured: "The extraordinary fact is that belief has survived such tests again and again—not because it comforts or explains, but because believers cannot deny what has been shown or given to them." Although many harsh experiences "seem to point to a completely arbitrary world," convictions about divine mercy will remain in place because those convictions "have imposed themselves on the shape of a life and the habits of a heart" (Williams 2005, p. 22).

My aim in telling this story is not to scoff at apologetics for

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otherworldly belief, though I do regard them as uniformly feeble, but to call attention to a clash between two intellectual currents. One is scientific empiricism, which, for better or worse, has yielded all of the mechanical novelties that continue to reshape our world and consciousness. We know, of course, that science can be twisted to greedy and warlike ends. At any given moment, moreover, it may be pursuing a phantom, such as phlogiston or the ether or, conceivably, an eleven-dimensional superstring, that is every bit as fugitive as the Holy Ghost. But science possesses a key advantage. It is, at its core, not a body of correct or incorrect ideas but a collective means of generating and testing hypotheses. Its trials eventually weed out error with unmatched success.

When the Archbishop of Canterbury mentions "effects [that] follow causes in a way that we can chart," he writes as an heir, however grudging, of the scientific revolution. But when he reads the Creator's mind at a remove of nearly fourteen billion years, and when he implies that some prayers stand a good chance of being answered, empiricism has given way to lore supported only by traditional authority. That is the kind of soothing potion that people quaff when they either haven't learned how to check the evidential merits of propositions or would rather not risk the loss of treasured beliefs.

If you were to ask the archbishop whether he subscribes to Darwinian scientific principles, I am sure the answer would be yes. So, too, in 1995 Pope John Paul II famously granted that evolution is now "more than a theory." But since the late pope proceeded at once to airbrush humankind from the evolutionary picture and to reassert *for our species alone* the church's perennial creationist legend, it is clear that he was no Darwinian in any meaningful sense. And the same must be said of Rowan Williams. In calling the recent tsunami an entirely natural event he was invoking plate tectonics, a branch of geology whose range of application extends backward by several billion years; but if he were at all sincere about adjusting his perspective to that time frame, he could hardly have gone on to assert that nature's laws were fashioned for the benefit of *Homo sapiens*, a great ape whose entire period of existence has occupied not even a nanosecond of the cosmic hour.

Such inconsistencies, when they are pointed out so blatently, look craven and inexcusable. But that judgment isn't shared outside intellectual circles, and even within them one hears influential voices protesting the encroachment of science on intuitively held truths. Conservatives who aren't already observant believers tend to feel protective toward religion because, in their judgment, it is the only guarantor of precious values that are jeopardized by rampant libertinism. And although theory-minded leftists and radical feminists have no investment in theism, many of them associate science with a masculinist, capitalist, imperialist rapacity that has brutalized Mother Earth. On these and other grounds, some progressives feel entitled to discount any scientific results that contradict the felt verities of ideology.

In addition, some scientists and philosophers who are privately indifferent or hostile to transcendent claims nevertheless seek an accommodation with them. They do so from the best of motives, in order to stem the infiltration of bumpkin "creation science" or its slick city cousin, "intelligent design," into biology curricula. Their hope is to show that scientific research and education have no bearing on issues of ultimate meaning and hence needn't be feared by the pious. To that end, they emphasize that science exemplifies only *methodological naturalism*, whereby technical reasons alone are cited for excluding nonmaterial factors from reasoning about causes and effects. Hence, they insist, the practice of science doesn't entail *metaphysical naturalism*, or the atheist's claim that spiritual causation is not only inadmissible but altogether unreal.

In one sense this is an impregnable argument. Even when science is conducted by ardent believers, it has to disregard theological claims because those claims typically entail no unambiguous, real-world implications, much less quantitative ones, that might be tested for their supportive or falsifying weight. The allegation that God was responsible for a given natural fact can't be either established or refuted by any finding; it is simply devoid of scientific interest. And thus it is true enough that scientists stand under no logical compulsion to profess metaphysical naturalism.

Quite obviously, however, trust in the supernatural does get shaken by the overall advancement of science. This is an effect not of strict logic, but of an irreversible shrinkage in mystery's terrain. Ever since Darwin forged an exit from the previously airtight argument of design, the accumulation of corroborated materialist explanations has left the theologian's "God of the gaps" with less and less to do. An acquaintance with scientific laws and their uniform application is hardly compatible with faith-based tales about walking on water, a casting out of devils, and resurrection of the dead.

Metaphysical naturalism may be undiplomatic, but it is favored by the totality of evidence at hand. Only a secular Darwinian perspective, I believe, can make general sense of humankind and its works. Our species appears to have constituted an adaptive experiment in the partial and imperfect substitution of culture for instinct, with all the liability to self-deception and fanaticism that such an experiment involves. We chronically strain against our animality by inhabiting self-fashioned webs of significance—myths, theologies, theories—that are more likely than not to generate illusory and often murderous "wisdom." That is the price we pay for the same faculty of abstraction and pattern drawing that enables us to be not mere occupiers of an ecological niche but planners, explorers, and, yes, scientists, who can piece together facts about our world and our own emergence and makeup.

Here it may be objected that myths, theologies, and theories themselves, as nonmaterial things that can nevertheless set in motion great social movements and collisions of armies, confound a materialist or metaphysically naturalist perspective. Not at all. We materialists don't deny the force of ideas; we merely say that the minds precipitating them are wholly situated within brains that, like everything else about which we possess some fairly dependable information, seem to have emerged without any need for miracles. Although this is not a provable point, it is a necessary aid to clear thought, because now that scientific rationality has conclusively shown its formidable explanatory power, recourse to the miraculous is always a regressive, obfuscating move.

It is true, of course, that some nominally scientific developments have themselves been irrationally based. I have emphasized metaphysical issues here only because the human penchant for disastrously confusing fantasy with fact is most plainly seen in the impulse to ascribe one's own concerns to divine powers and then to harden one's heart against unbelievers. Interestingly, the secular follies to which I object, such as Freudian psychoanalytic theory and the "recovered memory" craze to which it inadvertently gave rise, have displayed most of the features that characterize religious fanaticism, such as undue deference to authority, hostility toward dissenters, and most basically, an assumption that intuitively held certitude is somehow more precious and profound than the hard-won gains of trial and error.

Like the Archbishop of Canterbury, who allows "habits of the heart" to overrule canons of evidence, many spokesmen for entrenched interests subscribe to a two-tiered conception of truth. They make a token bow to empirically grounded knowledge, but they deem it too pedestrian for mapping the labyrinth of the soul or for doing justice to the emotional currents coursing between interacting persons. Instead of merely avowing that the subjective realm is elusive, however, they then advance their own preferred theory, which is typically sweeping, absolute, and bristling with partisanship.

I suggest that there is no such thing as deep knowledge, in the sense of insight so compelling that it needs no validation. There is only knowledge, period. It is recognizable not by its air of holiness or its emotional appeal but by its capacity to pass the most demanding scrutiny of well-informed people who have no prior investment in confirming it. A politics of sorts, neither leftist nor rightist, follows from this understanding. If knowledge can be certified only by a social process of peer review, we ought to do what we can to foster communities of uncompromised experts. That means actively resisting guru-ism, intellectual cliquishness, guilt-assuaging double standards, and, needless to say, disdain for the very concept of objectivity.

My mention of experts, however, can't fail to turn a spotlight on my own qualifications, if any, for passing judgment on such diverse and contested matters as natural selection, human motivation and its development, psychological tests, hypnosis, UFO reports, and recovered memory, to say nothing of theosophy and Zen Buddhism. I do lack the requisite background for adding substantive contributions to any of those topics. But in my writings I make no pretense of doing so. Rather I regularly defer to specialists who are conversant with the state of their own discipline and who have already laid out powerful critiques of ill-conceived theories and unworthy dodges. And where the specialists disagree among themselves while honoring the same stringent rules for exposing mistakes, I never venture an opinion.

The question, of course, is how an outsider can be sure that one school of thought is less entitled to our trust than a rival one. In many instances such confidence would be unwarranted. Certain indicators of bad faith, however, are unmistakable: persistence in claims that have already been debunked; reliance on ill-designed studies, idolized lawgivers, and self-serving anecdotes; evasion of objections and negative instances; indifference to rival theories and to the need for independent replication; and "movement" belligerence. Where several of these traits are found together, even a lay observer can be sure that no sound case could be made for the shielded theory; its lack of competitiveness is precisely what has necessitated these indulgences.

But then another doubt looms: if bad practices are so conspicuous, why should I or anyone else need to harp on them? At least two reasons come to mind. First, strong factions within such practical endeavors as psychotherapy, projective testing, and social work remain wedded to dubious and harmful notions that are tolerated or even advanced by mainstream guilds. The outrage that some of my essays have encountered when first published attests to the challenge they posed to rooted assumptions. And second, charismatic trend-setters in the academic humanities have shown themselves to be credulous about scientifically disreputable notions. Although I can't hope to inhibit such high fliers, perhaps I can encourage some of their potential followers to see that real interdisciplinarity requires vigilance against junk science.

It suits my temperament to study indefensible pretensions and to note how they cause intelligent people to shut off their critical faculties and resort to cult-like behavior. Sometimes amusing, sometimes appalling, such deviousness strikes me as quintessentially human behavior. But I don't mean to set myself apart as a paragon of reasonableness. Having made a large intellectual misstep in younger days, I am aware that rationality isn't an endowment but an achievement that can come undone at any moment. And that is just why it is prudent, in my opinion, to distrust sacrosanct authorities, whether academic or psychiatric or ecclesiastic, and to put one's faith instead in objective procedures that can place a check on our never-sated appetite for self-deception.

Several decades of turbulent experience in the public arena, however, have led me to anticipate only limited success in getting this point across. To put it mildly, the public in an age of born-again Rapture, intelligent design, miscellaneous guru worship, and do-it-yourself "spirituality" isn't exactly hungering for an across-the-board application of rational principles. And the culturally slumming, trend-conscious, postmodern academia, far from constituting a stay against popular credulity, affords a parodic mirror image of it. That is a condition I have illustrated, for example, regarding tales of UFO kidnapping: for opposite reasons, guileless "abductees" and supercilious theory mongers show the same imperviousness to considerations of mundane plausibility.

A student who signs up for a literature major today, having never been encouraged to think independently and skeptically, may graduate two years later without having made any headway in that direction. That is regrettable enough. But if the student then goes on to earn a PhD in the same field, he or she will probably have acquired a storehouse of arcane terms and concepts allowing that disability to appear both intellectually and politically advanced. Here is tomorrow's tenured professor, more impervious than any freshman to the "naïve" heresy that theories can be overturned by facts.

My best-known essays, "The Unknown Freud" and "The Revenge of the Repressed," bring to mind an especially ironic consequence of my attempts to promote impersonal standards of judgment. Advocates of psychoanalysis from Freud to the present day have responded to the movement's critics by largely ignoring scientific, medical, and logical challenges and focusing instead on the critics' own alleged defects of personality. The result in my case is that I owe such name recognition as I possess mostly to Freudians and their cousins, the recovered memory therapists, who have wanted me to personify the mechanisms of repression and denial and the mood of oedipal rage that must surely lie behind my malicious attacks.

Thus I awoke one day in 1993 to find myself notorious. The difference was made not by what I had recently written (I had been making essentially the same case from 1980 onward) but by where it had appeared: in *The New York Review of Books*, which, rightly or wrongly, the analysts had regarded as their haven. Though my intention all along had been to alert the public to thirty years' worth of important revisionary scholarship by others, I now began to see myself characterized as "the foremost critic of psychoanalysis." It was the Freudians themselves who gladly awarded me that role, the more handily to dismiss all reservations about their craft as the symptoms of one man's neurosis.

Intellectually and culturally, the West in the twentieth century did dwell largely in Freud's shadow, but no portion of his legacy is secure today. At such a juncture, I believe, it is important to think carefully about how and why the opinion-setting classes were led astray. What we need is not a new secular god to replace Freud but a clear realization that we already possess, in our tradition of unsparing empirical review, the tools we need to forestall another such outbreak of mass irrationality.

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The Religion Blues

Alan Dean Foster

I've been a few places and I've seen a few things.
I've met a few folks and answered a few rings.
Most everywhere I go, I seem to get along.
It's only one subject that sours the song.
I try to avoid it
And not to discuss it;
If it was left up to me
I'd just as soon flush it.

Chorus:
Well, the Christians hate the Muslims,
And the Muslims hate the Jews,
And the Buddhists go around and 'round
And don't know what to choose.

I've driven the plains of Africa
To north and south and west,
And for the very life of me,
I couldn't tell you which was best.
But no matter where I go,
It makes me feel low
Whenever religion is mentioned
And reason's replaced with show.

Chorus:
Yes, the Christians hate the Muslims,
And the Muslims hate the Jews.
And the Buddhists go around and 'round,
The idea's just to confuse.

I've played with otters in the Pantanal;
I've had roast guinea pig in Peru.
The people there have nothing at all,
While the churches praise the few.
It makes me sick,
This age-old trick,
This promise of a holy heaven
That never seems to stick.

Chorus:
Yes, the Christians hate the Muslims,
And the Muslims hate the Jews.
The Buddhists go around and 'round,
And I really must refuse.

I've sailed the Pacific west to east,
And I've dived it north to south.
The people there are some of the best—
Just watch what you say with your mouth.
'Cause it's church every Sunday,
No more fishing and play.
That would defy God's word,
And happiness is against The Way.

Chorus:
Ah, the Christians hate the Muslims,
And the Muslims hate the Jews.
As for me, I think I might check out,
'Cause I've surely paid my dues.

You just have to look at history,
It really is depressing;
There actually is no mystery,
When it's Truth that does the confessing.
You got your Crusades,
Your pogroms, and ambushcades.
Who needs the Inquisition,
When, right here, we've got Hades.

Chorus:
Oh, the Christians hate the Muslims,
And the Muslims hate the Jews.
Better pray for me all that you can,
'Cause I've got those low-down religion blues.

Although he has published articles on science, travel, and scuba diving, Alan Dean Foster is probably better known as a writer of science fiction and a world traveler who has spent time in more than eighty countries. He is currently working on his 107th book. He lives in Prescott, Arizona.

The Clash of Biotechnology and Post-Christian Spirituality

Christian fundamentalists and anti-biotech radicals may seem to have little in common. But at a root level both are driven by a fear of violating a transcendent, divine authority.

LEE M. SILVER

The long history, legacy, and pervasive impact of biotechnology on humankind and the biosphere as a whole is not fully appreciated even by many well-educated people. Although commonly thought to be an invention of twentieth and twenty-first century scientists working inside high-tech labs, *biotechnology*—defined as "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use" (United Nations 1992)—was first developed at the end of the last Ice Age, when human populations grew rapidly and spread out across the subtropical and temperate zones of the Americas and Eurasia.

Large numbers of mammalian species (including mammoths, mastodons, giant ground sloths, and saber-tooth tigers) were driven to extinction, and edible vegetation was over-foraged. When the global footprint of humankind was smaller, in earlier times, a tribe could get up and move from a nutritionally depleted habitat into virgin land. But now, habitable regions of the globe were becoming exhausted. Another species might have collapsed under the weight of its own voracious appetite, but human genes had endowed human beings with the capacity to initiate a revolutionary lifestyle change that blew apart the traditional equations of adaptation and survival. Instead of fitting into a world of wild plants and animals as best as they could—like every creature before—human beings took the reins of evolution into their own hands and initiated the agricultural revolution.

An agricultural mindset emerged from the human discovery of what we now call *genes*—the invisible constituents of seeds and semen responsible for the transmission of unique plant and animal characteristics. In at least four far-flung human communities, genetic understanding afforded people the power to generate novel organisms with increasingly "superior" traits. Genetic superiority was defined not by what was best for the plant's survival in its wild form, but by a marginal increase in value to farmers and consumers. In Central America, the slender seed-producing stem of the weed *teosinte* was transformed into a cob of corn with a hundred-fold increase in kernels that don't fall off (Fedoroff 2003). In South America, shrubs from the poisonous nightshade family (*Solanaceae*) with tuberous roots, spiny branches, and bitter berry-sized fruit were transformed into juicy red tomatoes, potatoes, sweet potatoes, and peppers. Low-value wild plants in other parts of the world were similarly transformed into rice, barley, wheat, and other high value grains (Smith 2001).

Animals also were genetically transformed to increase their value. Hairy goats were bred into domestic sheep that grow unnatural billowing coats of wool, and oxen became ten-gallon-a-day milk-producing factories with an amino acid composition altered unknowingly to better suit human nutrition (Beja-Pereira et al. 2003). In both of these instances and others, new trait combinations were derived by breeding different species together (Bruford, Bradley, and Luikart 2003). (The llama was created by force-breeding species from different genera in the Andean mountains.) In nearly all cases, domestication was also associated with selected alterations in behavioral genes that made animals docile and accepting of human proximity.

Biotechnology's significance is hard to exaggerate. Its invention represented a fundamental turning point in the story of the human species and provided the gateway to civilization. When a wild plot of woods or brush was converted into a cornfield or rice paddy, the yield of edible vegetation could be multiplied by many orders of magnitude. Cultivation allowed a tribe to settle in one place; surplus food allowed labor diversification; settlements grew into towns, cities, and nations; and domesticated organisms were transported and traded across the Americas, Europe, Asia, and Africa.

Traditional agriculture is founded on the ecosystem-destroying slash-and-burn method that is still practiced in the jungle of west Africa, as shown here.

The Loire Valley of France, where over 99 percent of the landscape has been modified with plant and animal species that didn't exist there prior to human invasion.

Domesticated animals became so different from wild "beasts" that the authors of the Old Testament assumed God must have created them separately (see Genesis 1:25). Likewise today, Central American peasants believe that corn was given to them by the gods rather than the cleverness of their ancestors. They are not alone in their lack of knowledge. Few college-educated Westerners know that most things we eat bear little resemblance to their wild ancestral species. Most don't notice the fact that corn stalks are never found outside of cultivated farmlands.

Today, 38 percent of the world's landmass is devoted to agriculture, an additional 15 percent is used for human habitation,

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and in every locality there are domesticated plants and animals that originated far, far away (United Nations Environment Program 1997). Invasive descendants of narrow-range Mexican teosinte, east Asian-derived rice and pigs, and near-Eastern-derived wheat and cows are bred across Europe, Africa, and Asia.

A sense of the extent to which the European landscape had already been remolded during the classical age can be seen in the 180 A.D. writings of the Roman scholar Tertullian: "Surely it is obvious enough, if one looks at the whole world, that it is becoming daily better cultivated and more fully peopled than anciently. All places are now accessible, . . . cultivated fields have subdued forests; flocks and herds have expelled wild beasts; the very sands are sown; the rocks are planted; the marshes drained . . . everywhere are houses, and inhabitants. . . ."

If you travel by train across Europe today and peer out the window, you will see a landscape dominated by cropland or pasture land with an occasional grove of trees and pleasant villages sporting medieval churches. Not one bit of it looks the way it did ten thousand years ago. The big wild animals are all gone, replaced by pasteurized cows, lulling about, chewing the cud. European countries do have some large protected woodlands and national parks where wilderness has been allowed to reassert itself on previously cleared plots. But DNA studies of ancient pollen show that the composition of current "wild" vegetation bears little resemblance to what existed before the agricultural revolution. In fact, since the dawn of civilization, few if any of the earth's ecosystems have escaped direct or indirect replacement by humankind.

Organic Vitalism in the Modern World

The essential difference between sowed and wild plants is that after crops are grown, they are carted away to be eaten by people (or by animals that are eventually eaten by people). As a result, large quantities of fixed nitrogen and other essential minerals are transferred out of the land and into us. In the prescientific era, it seemed as if the "life-force" had been drained from the soil. Although fertility could be regenerated with the use of manure and other organic waste, agricultural productivity was still limited by the speed at which these natural resources were produced.

At the beginning of the twentieth century, the major limitation imposed by manure-based fertilizer was overcome with the invention of a laboratory process for creating fixed nitrogen directly from the air we breath. Today, 70 million tons of synthetic fertilizer are used annually to grow food that sustains 40 percent of the world's population (Fryzuk 2004). If the process were suddenly banned, two billion people would starve to death, unless the remaining forests on the planet were reclaimed, which wouldn't be very good for human health either.

Rural Europeans saw this scientific breakthrough in a very different light. They were confronted with the claim that the life-force could be manufactured without life, and they were thoroughly confused. At the same time, industrial fertilizer and other synthetic products and machinery represented an enormous threat to traditional agrarian cultures. In 1924, the Austrian philosopher and mystic Rudolf Steiner came to their rescue with a scientific-sounding argument for the superiority of what he called Biodynamic® (meaning life-force) agriculture (Steiner 2003). Contemporary Biodynamic farmers still adhere religiously to Steiner's rules, which take into account the positions of the sun, moon, planets, and constellations in determining when to sow and harvest. The pre-Copernican illusion of Saturn reversing its direction as it travels across the sky is particularly worrisome. (I am not making this up.) Domesticated animals are a critical part of the system because they "preserve and recycle life-forces" through their manure.

Furthermore, each farm is supposed to represent an individual self-sufficient organism within the larger organism that is Mother Earth. Unfortunately, self-sufficiency is almost impossible to achieve on a small farm, and so farmers are allowed to purchase and apply various Biodynamic compost preparations made according to Steiner's recipes, including one marketed to "attract cosmic forces to the soil." Americans can now buy certified Biodynamic coffee from Café Altura, certified Biodynamic wine produced by Frey Vineyards, and certified Biodynamic children's clothes from www.Sckoon.com, among many other Biodynamic products.

Before the eighteenth century, most scholars assumed that the material substance of living organisms was fundamentally different from that of nonliving things—organisms and their products were considered organic by definition, while nonliving things were mineral or inorganic. With the invention of chemistry, scientists uncovered the incoherence of the traditional distinction, and chemists began to use the word *organic* to describe all complex carbon-based molecules whether or not they were actually products of any organism. Nevertheless, in 1942, the American publisher J.I. Rodale roundly ignored these advances in understanding and resurrected the pre-scientific vitalistic definition of *organic* in the title of his magazine *Organic Farming & Gardening*, still in circulation today. Inspired by Steiner's Biodynamic belief that "we must look to Mother Earth as our great nourishing mother," Rodale and all current-day organic farmers, reject the use of all lab-created substances in the production of organic food (Steiner 2003).

The "organic food" movement was not taken seriously by U.S. government agencies until 1990, when lobbyists convinced Congress to mandate the establishment of a certification process for organic foods. Twelve years later, organic farmers finally obtained rules they wanted to prevent impostors from siphoning off market share. But as the USDA emphasizes, the "basis of these standards is on process, not product." In other words, organic food is defined not by any material substance in the food itself, but instead by the "holistic" methods used on organic farms. Furthermore, the physical attributes of the product and any effects it might have on environment or health are explicitly excluded from American, European, and international definitions.

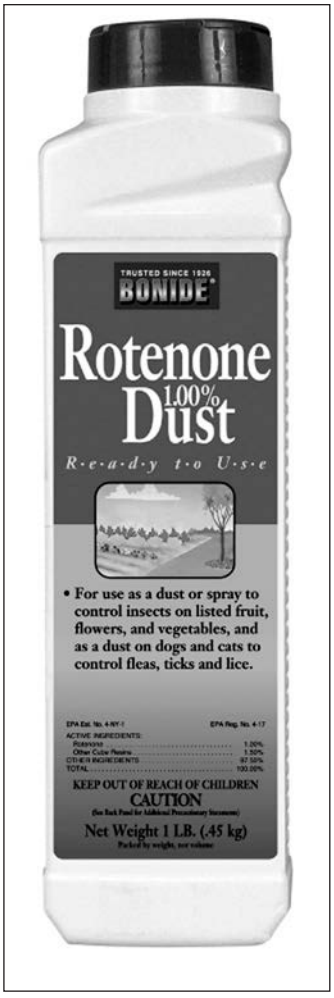
The implicit, unproven assumption is that organic agriculture is—by its very nature—better for the environment than

so-called conventional farming. The European Commission states as a matter of fact that "organic farmers use a range of techniques that help sustain ecosystems and reduce pollution." Yet, according to self-imposed organic rules, genetic modification in the laboratory is strictly forbidden, even if its purpose is to reduce an animal's negative impact on the environment. (Canadian scientists have already engineered pigs to secrete an enzyme in their saliva that reduces the polluting phosphorous content of their manure by up to 75 percent; see Golovan et al. 2001.) On the other hand, spontaneous mutations caused by deep-space cosmic rays are always deemed acceptable—without any testing—since they occur "naturally." In reality, laboratory scientists can make subtle and precise changes to an organism's DNA sequence, while high-energy cosmic rays can break chromosomes into pieces that reattach randomly and sometimes create genes that didn't previously exist.

Even more than a concern for the environment, organic producers and consumers are driven by faith in the presumed health benefits of their holistically produced food. In *The Future of Food*, a full-length anti-biotech movie, Canadian farmer Marc Loiselle explains, "the underpinning of my conversion to organic food is not so much the economic point, it's the health point, to protect my health, to protect my family's health and my neighbors'." Irrespective of whether they buy into the health rhetoric or not, Western consumers have been led to believe that organic farmers are never allowed to use toxic chemical pesticides. In fact, this carefully cultivated belief is simply false. Pyrethrin (with the formula $C_{21}H_{28}O_3$) is one of several common toxic chemicals sprayed onto fruit trees by organic farmers (even on the day of harvesting); another allowed chemical is rotenone ($C_{23}H_{22}O_6$), a potent neurotoxin, long used to kill fish, and recently linked to Parkinson's disease (Betarbet et al. 2000).

How can organic farmers justify the use of these chemical pesticides? The answer comes from the delusion that substances produced by living organisms are not really chemicals. Since pyrethrin is extracted from chrysanthemums and rotenone comes from a native Indian vine, they are deemed organic instead. However, the most potent toxins known to humankind, including ricin and strychnine, are all natural and organic.

In fact, all currently used pesticides—both natural and synthetic—dissipate quickly and pose a minuscule risk to consumers. Nevertheless, faith in nature's beneficence can still be fatal to some children. About 5 percent express severe allergic reactions to certain types of natural food, and every year, unintentional ingestion causes hundreds of thousands of cases of anaphylactic shock with hundreds of deaths. The triggering agents are actually a tiny number of well-defined proteins in certain foods—including peanuts, soybeans, tree nuts, eggs, milk, and shellfish—that are resistant to digestive fluids. These specific proteins linger in the intestines long enough to provoke an allergic immune response in susceptible people.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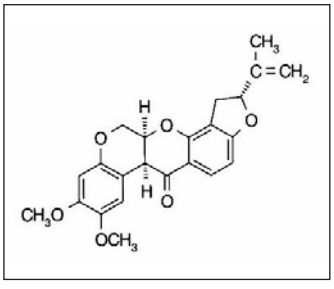

Chemical structure of rotenone

No society has been willing to ban the use of any allergenic ingredients in processed foods, even though this approach could save lives and reduce much human suffering. Gene-modification technology could offer a more palatable alternative: the use of targeted RNA silencing technologies to turn off plant allergen genes. With this approach, scientists have already created low-allergenicity soy, and promising results have been reported for both peanuts and shrimp (Herman et al. 2003).

Some day perhaps, conventional soy and peanut farmers will all switch production to low-allergenicity GM [genetically modified] crop varieties. If that day arrives, organic food produced with GM-free organic soy or peanuts will be certifiably more dangerous to human health than comparable non-organic products. Unfortunately, conventional farmers have no incentive to plant reduced-allergy seeds when sales of their current crops are unrestricted, especially when the public has been led to believe that all genetic modifications create health risks. In the current social and economic climate, much of the critical research required to turn promising results into viable products is simply not pursued. As a result, anti-GM, organic food advocates may be indirectly responsible for avoidable deaths of future children.

Post-Christian Spirituality

As the human population continues to increase, traditional "organic" methods of plant and animal farming will consume more land to feed more people, at the cost of more lost forests, more environmental degradation, and greater species extinction. At the same time, a pervasive fear of modern biotechnology prevents any deployment by the public sector to achieve humani-

tarian or environmental goals, including a reduction in the size of the global human footprint. As the Food and Agricultural Organization (FAO) of the United Nations explained in their 2004 report, "The majority of agricultural biotechnology research is being carried out by private companies based primarily in industrialized countries. This is a dramatic departure from the Green Revolution, in which the public sector played a strong role in bringing the power of agricultural research to bear on the problems of hunger and rural poverty in the developing world" (Food and Agricultural Organization of the United Nations 2004).

The stubborn persistence of irrational beliefs that fly in the face of scientific knowledge and empirical evidence can usually be traced to religious indoctrination. In the Western world, Christian dogma always appears as the first suspect. And yet, educated, traditional Christians are mostly willing to evaluate genetically modified crops strictly on the basis of a rational assessment of costs and benefits. Thus, it is not surprising that six of the ten countries with the largest areas of GM crops under cultivation (in the year 2004) were in the Christian-dominated western hemisphere and none were from Europe (James 2004). The Christian acceptance of biotechnology has roots in the Bible where only "man" is said to be created in the image of a God who, in turn, gives us "dominion" over all plants and animals. But if Christianity is not responsible for anti-biotech dogma and historical ignorance, then what is? The answer—I argue here and more fully in my book *Challenging Nature*—is a post-Christian memetic belief system that diverged out of Christianity with entirely different values (Silver 2006).

The secularization of western education has led droves of people away from the teachings of the Church, especially in Europe where less than half of the people of many countries hold a belief in a "personal God" (The International Social Survey Program 1998). Some become atheists or agnostics, but just as many (including a quarter of the populations of Sweden, Switzerland, Austria, Norway, and western Germany) now answer affirmatively to a belief in "a higher power of some kind."

It seems that when the masculine God of the Bible is rejected, many people require a substitute to fill the spiritual void left behind. Since Western culture is permeated by insidious Judeo-Christian monotheism and eschatology, the simplest substitution occurs through a transformation of traditional Christian beliefs into a post-Christian religiosity. The sacredness of the material human body—symbolized in Jesus—morphs into the sacredness of a material Mother Nature. God's master plan for humanity becomes Mother Nature's master plan for the whole-earth biosphere. Earth's creatures are now viewed as component parts of Mother Nature's body, and their combined gene pool becomes the modern analogue of a divine spirit. In this light, the genetic engineering of plants is equated with disobedience toward the "higher power," who will ultimately seek revenge against humankind.

An example of post-Christian Mother Nature spirituality is etched into the Constitution of Switzerland through an amendment demanding respect for *l'intégrité des organismes vivants*, the integrity of living organisms, and *Würde der Kreatur*, the dignity of living nature as a whole. The amendment was not simply a call to alleviate animal suffering or to prevent animal breeding for food (since most who voted for the referendum eat meat). Instead, a majority of the Swiss people felt that their picture-perfect valleys of well-tended meadows, neat farms, and grazing cows represent a natural order that had to be preserved at a deeper spiritual level. It doesn't matter that every component of this picture is a direct result of human intervention into a previous natural order that has long since disappeared, and it doesn't matter that modern biotechnology could be deployed to benefit the environment. More important to the Swiss are the difficult-to-define concepts of *integrity* and *dignity*.

The results of an anonymous survey that I conducted with a sample of approximately 400 undergraduate students currently attending Princeton University provides a sense of the degree to which highly educated young Americans have become similarly infected with a Mother Nature meme. Among the questions asked was this one: "Can a species, an ecosystem, or another grouping of multiple organisms have a unified, immaterial spiritual soul?" Possible answers were yes, no, or maybe.

Although a belief in multi-organismal spirits is incompatible with traditional Christianity—the religion with which over 85 percent of Princeton students self-identify—only 48 percent of female students and 61 percent of men felt confident enough to reject the idea outright. Among female humanities majors, the proportion dropped to 36 percent. The results imply that even in Christian-dominated America, post-Christian spirituality has become a powerful force that needs to be reckoned with as well. (A more detailed analysis of data and speculation on the source of the Mother Nature meme is provided in *Challenging Nature*.)

The Depth of the Problem

Post-Christian, Mother Nature spirituality is pernicious, perhaps even more so than Christian fundamentalism, because it goes unrecognized, so often, both among those who hold such views and those with friends who hold such views. Post-Christian spiritualists will typically deny that they are religious at all, even as they remain steadfast in their belief that "natural" is good and "synthetic" is bad. A sense of spirituality, whether overt, covert, or subliminal, can endow seemingly simple words—such as *organic*, *natural*, and *life* itself—with meanings entirely different from those used in scientific discourse. As a consequence, rationalists and post-Christians talk right past each other without even realizing it. I do not claim that all expressions of spirituality are harmful or bad. Nor do I think all biotech applications are inherently good, ethical, or risk-free. Indeed, the decision to accept or reject some biotech applications will involve difficult tradeoffs among ethical values like human autonomy, preservation of cultural traditions, societal well being, and environmental protection. But a rational understanding that trade-offs are, indeed, involved is essential for good policy making in a democratic society. And the first step toward rationality is the exposure of subliminal

spiritual beliefs of all kinds.

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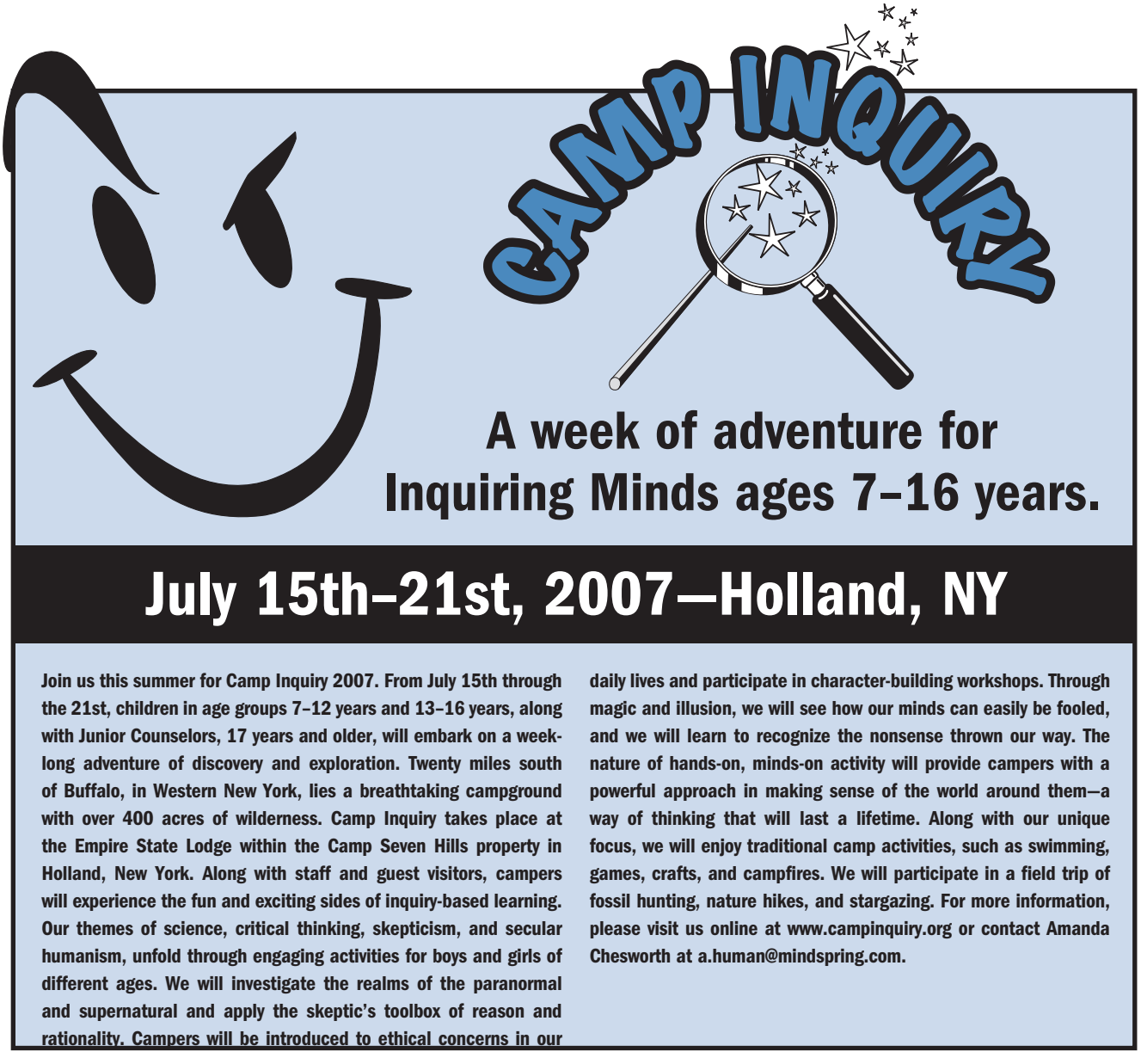
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Fighting the Fundamentalists

Chamberlain or Churchill?

We who think that biblical literalism has no place in science classrooms should be standing together and fighting ignorance and prejudice. Why then do those of us against creationism live in a house divided?

MICHAEL RUSE

The science and religion debate in America has seen its fair share of controversy, much of it bitter. From the moment that Charles Darwin published his *On the Origin of Species* in 1859, Americans have debated evolution, its place and role and significance, especially with respect to Christianity. Almost immediately, two leading Harvard professors, Louis Agassiz, the transplanted Swiss ichthyologist then building the Museum of Comparative Zoology, and Asa Gray, the diminutive professor of botany, clashed over the truth of evolution. Although both appealed to scientific facts, it was clear that religious issues were close to the surface. A decade later the leading American Presbyterian theologian, Princeton Seminary professor

Charles Hodge, wrote a little book titled: *What is Darwinism?* He answered the question himself: *It is Atheism!*

Before long, especially in the South and (as the country expanded) in the West, evolution was taken to be the equivalent of godlessness. The great evangelist Dwight Moody—the Billy Graham of his day—lectured on the four great evils of the age: ignoring the Sabbath, Sunday newspapers, the theater, and evolution (including atheism). As is well known, this hostility between evolution and Christianity continued into the twentieth century, most famously in 1925 in Dayton Tennessee, when the young schoolteacher John Thomas Scopes was put on trial for teaching that humans and apes share a common ancestor. Prosecuted by the Great Commoner, three-times presidential candidate William Jennings Bryan, and defended by noted freethinker Clarence Darrow, Scopes was found guilty (although the verdict was overturned on appeal) and the whole of America was riveted by the spectacle.

Neville Chamberlain

Winston Churchill

Many think that after the Scopes trial, Christian anti-evolutionism—such people took the Bible literally and were often known as Fundamentalists—sank with little trace. This is not true. After World War II, religiously based anti-evolutionism started to rise and gain in strength. This was in no small part because of the publication in 1961 of *Genesis Flood*. Coauthored by Biblical scholar John Whitcomb and hydraulic engineer Henry M. Morris, this work presented a definitive defense of a young Earth as well as a miraculous origin for the whole of life. A strong defense of Noah's Flood was also prominent, being a key part of the authors' "premillennial dispensationalism." This is a theology committed to periods of time ended by violent events, the first of which ended with the Deluge and the last anticipated in the near future ending with Armageddon, and the thousand-year rule of Jesus before the Final Judgment.

Now called creationism (often *scientific* creationism, to emphasize the scientific credentials and hence the appropriateness of introducing the ideas into science classrooms) things came to a head in Arkansas in 1981. A law mandating the teaching of creation science had been passed by the legislature, and the American Civil Liberties Union (ACLU) brought suit claiming that it violated the constitutional separation of church and state. The law was declared unconstitutional. It seemed that now finally the anti-evolutionary forces were conquered. This was far from so! In 1991, Berkeley law professor Phillip Johnson published *Darwin on Trial*, another anti-evolutionary work, claiming now that the chief sin was a commitment to naturalism, and the fight started all over again. Revitalized, the new Christian evangelical cry was that an intelligent designer must have been responsible for the irreducible complexity of the living world. Supporters of the position—notably Lehigh University biochemist Michael Behe, author of *Darwin's Black Box*, and mathematician-*cum*-philosopher William Dembski, author of *The Design Inference*—gathered much support and publicity for their claims. Another court case arose in 2005, this time in Dover, Pennsylvania, with no more success than the Arkansas case. Again, it would be very foolish to think we have heard the end of the matter. George W. Bush, an ardent evangelical Christian, is sympathetic to the thinking, and has already started to load the Supreme Court with people who think that the separation of church and state has gone too far.

Our time therefore is still one when those of us who think that Biblical literalism has no place in the science classrooms of the nation should be standing together and fighting ignorance and prejudice, if only on pragmatic grounds. The big threat today to America's status is the rapidly growing economies of the East, such as China and India. Of course, one welcomes this—better by far that the rest of the world share the prosperity of the West than that it look enviously from outside. But the aim must to be to bring them up rather than us down. No greater foolishness could happen than the castration of modern science in the name of evangelical Christianity. Science secondary education in America is in bad enough shape as it is, and there is no reason to make it worse. Furthermore, scientific discoveries are among the greatest achievements of the human spirit and intellect. We owe it to our young people to share this with them, giving them the training to go on to even greater triumphs.

Yet at the moment, those of us against creationism live in a house divided. One group is made up of the ardent, complete atheists. They want no truck with the enemy, which they are

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inclined to define as any person of religious inclination—from literalist (like a Southern Baptist) to deist (like a Unitarian)—and they think that anyone who thinks otherwise is foolish, wrong, and immoral. Prominent members of this group include Richard Dawkins, the biologist and popular science writer; Daniel Dennett, the philosopher and also a successful popular pundit; and Jerry Coyne, the leading evolutionist. The second group is made of two subgroups. One has as members liberal Christians who think that evolution is God's way of creating. This subgroup contains the Catholic theologian John Haught, the Anglican physicist John Polkinghorne, and the late Pope John Paul II. The second subgroup contains those who have no religious belief but who think that one should collaborate with liberal Christians against a shared enemy, and who are inclined to think that science and religion are compatible. Members include Eugenie Scott of the National Center for Science Education, the late Stephen Jay Gould, paleontologist and popular science writer, and me. (From now on, rather than drag others into the fight, I will speak only for myself.)

The rhetoric is strong and nasty. I have accused Dennett of being a bully and someone who is pig ignorant of the issues. He has told me that I stand in danger (perhaps over the point of danger) of losing the respect of those whose respect I should crave. He and Harvard linguist Steven Pinker wrote a letter to *The New York Times,* after a review of one of my books, regretting that something like this might receive favorable attention. Dawkins has gone even further; in his new, best-selling book, *The God Delusion*, Dawkins likens me to Neville Chamberlain, the British Prime Minister who tried to appease Adolf Hitler. Dawkins introduces a new norm for journalists, begging them to interview others and get the *real* truth if they had previously spoken to me.

Without praising or excusing myself, I can say that I have been in the trenches for a long time. I first debated biblical literalists back in 1977. One opponent was the above-mentioned Henry M. Morris. He was joined by his associate Duane T. Gish, author of *Evolution: The Fossils Say No!* with then more than 150,000 copies sold, according to its cover. The site was an indoor sports arena at Northwestern University in Evanston, Illinois, and the audience, at least 3,000, had been brought in from all over the local area and neighboring states. Before the debate, at least ten people in the stands believed in evolution, and, after the debate, at most ten of them believed in evolution. I was judged to have lost.

Undaunted, I have kept up the fight—first against these older young-Earth creationists (believing in that 6,000-year span since Adam and Eve), and later against the more sophisticated intelligent design theorists, those who argue that something (or rather Something) must have intervened to cause the irreducible complexity of organisms. Alongside such luminaries as Stephen Jay Gould, I appeared as a witness for the ACLU in the Arkansas case, testifying against a creationist law that the legislature was imposing on the children of the state. I have appeared many times on radio and television, usually debating creationists and arguing that they are not just wrong but that their position is in no way scientific. And I have produced more words than any reasonable person might be expected to read, let alone write.

It is not surprising, therefore, that I am not universally loved by all of those who do battle in today's fight in America between science and religion. It is true that the creationists have not been slow to criticize. Henry Morris, who died in 2006, accused me personally of being responsible—through my Darwinian materialism—of America's altogether-too-slack attitude toward capital punishment. Would that this were true! But the ones who really are after me are my fellow Darwinians. In a way this is odd. For the record, I am absolutely committed to the belief that science is our highest form of knowledge. I believe that Darwinian evolutionary theory is true in all basic respects, and that it applies to humankind. I have even been recently quoted (correctly) in *The New York Times* as saying that I believe that ethics is "an illusion of the genes to make us good social animals." And I have no religious faith at all. You could call me an atheist, although I prefer *skeptic*, for I simply have no answers to the ultimate questions.

I am on the outs with the militant atheist group because I do not see that committing oneself to science necessarily implies that one thinks that all of religion is false, and that those who worship a supreme being are in some respects at one with the fanatics who flew planes into the World Trade Center. Of course, I think some religious beliefs are wrong and dangerous. That is why I fight creationists. But overall, I don't think someone is silly or immoral if he or she is a practicing Christian or Jew or Muslim or whatever. Although I don't think you have to be a believer to be good, I fully accept that many believers are good because of their beliefs. Moreover, I think it is both politically and morally right to work with believers to combat ills, including creationism.

The Dawkins-Dennett school allows no compromise. Religion is false. Religion is dangerous. Religion must be fought in every way. There can be no working with the enemy. Those like me who work with religious people are like the appeasers before the Nazis. This was the message thumped out again and again at a recent meeting of true believers in San Diego, widely reported in the major newspapers [see George Johnson's report, "A Free-for-All on Science and Religion," page 24]. With some few exceptions (notably the anthropologist Melvin J. Konner) the word was that the right approach to religion in American life is unremitting hostility and attack. Only that way will the truth prevail. Sir Harry Kroto, a Nobel Prize winning colleague at my own university of Florida State, begged the John Templeton Foundation to give to Richard Dawkins its annual prize for advances in religion!

My response is in part pragmatic. The creationists and the ID supporters simply love Dawkins and his ilk. They pray that they will say more and more. Every time the atheists open their mouths they win converts to the literalist cause. The creationists have been saying all along that Darwinism equals atheism, and now the Darwinians apparently agree! Americans in the middle—meaning, generally, religious Americans in the middle—get the message that science, and Darwinism partic-

ularly, threatens their faith. Dembski once wrote to Dawkins: "I know that you personally don't believe in God, but I want to thank you for being such a wonderful foil for theism and for intelligent design more generally. In fact, I regularly tell my colleagues that you and your work are one of God's greatest gifts to the intelligent design movement. So please, keep at it!"

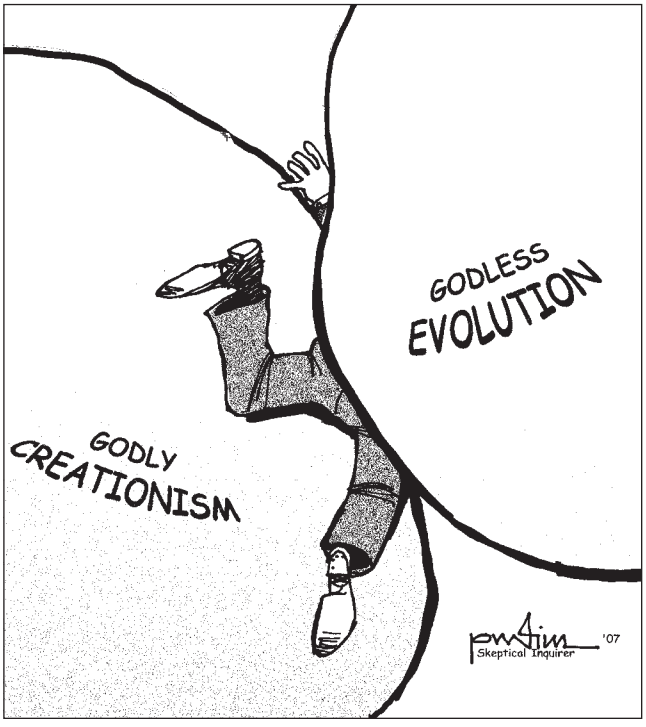
But pragmatic factors are not my real gripe. If I thought Dawkins and company were right, I would defend them one hundred percent and let the chips fall where they may. My real problem is one of scholarship, put simply, which is I guess what you would expect of a university professor like myself. I would be a lot more impressed with the ardent atheists if I felt that they were making a genuine effort to engage in dialog with those whom they criticize. I do not necessarily mean actual physical dialog, but at the least an intense study of the claims of those against whom they fulminate. Take, for instance, Richard Dawkins's *The God Delusion*, and his critiques of the various arguments for the existence of God. Why does he not acknowledge that few if any Christians have ever claimed that the proofs are the true reason for the belief in God? John Henry Newman, the great nineteenth-century English theologian, first an Anglican (Episcopalian) and then a Roman Catholic, spoke for many. About his seminal philosophical work, *A Grammar of Assent*, he wrote, "I have not insisted on the argument from design, because I am writing for the nineteenth century, by which, as represented by its philosophers, design is not admitted as proved. And to tell the truth, though I should not wish to preach on the subject, for forty years I have been unable to see the logical force of the argument myself. I believe in design because I believe in God; not in a God because I see design." (This is from a letter written in 1872.) He continued, "Design teaches me power, skill and goodness—not sanctity, not mercy, not a future judgment, which three are of the essence of religion."

The proofs are at best a backup for an already-received commitment. More than this, the proofs are a lot more subtle than these critics recognize. Take the cosmological argument, for example. From at least the time of Saint Augustine, around 400 A.D., theologians have been wrestling with the sense in which God can be said to be both necessary and eternal. Saint Augustine had a very sophisticated theory that entailed God being outside time—that is why Augustine would not have found the idea of evolution threatening, because for his God the thought of creation, the act of creation, and the product of creation are as one. Augustine explicitly claimed that God created seeds of life that then unfurled. The point is that for Augustine—and even more for Aquinas (1225–1274)—God is a stopping point in the chain of causation. The argument was that things have a cause and we must have some cause of the world in which we live. An infinite causal chain is no solution. Hence, there must be such a being that breaks the chain, namely the eternal God.

You may not like this argument and want to challenge it. I think I would. But I don't find it stupid, and I do find it worthy of careful study. I want to dig into what the notion of necessary existence might mean and whether in this day of modern physics it makes sense to talk of things being outside time. (Of course it makes sense to talk of things outside time; 2+2=4 is outside time. It never became true and will never become false. The question is whether this sort of thinking can be transferred to God.) My point is simply that if you are going to consider religion the chief cause of the world's ills, then you owe it to yourself and to others to take seriously the claims of religion, and this I do not think is done. I fear that emotion rules rationality, the very sin of which the critics accuse the religious! In other words, I start to suspect that these people are in their way are tarred with the same features of which they accuse the creationists. There is a dogmatism, a refusal to listen to others, a contempt for nonbelievers, a feeling that they alone have the truth, that is the mark of so many of the cults and sects that have sprung on American soil since the nation's founding.

Blind religious conviction is a terrible threat in American society today. What we need is reason and cool thinking. Science is the highest form, even if not necessarily the only form. But let us not mistake science for scientism, the belief that science and science alone has all of the answers. Let us not think that those suspicious or rejecting of scientism are wrong, verging on immoral. And let us not say that those who are prepared to work with people who think that science does not have all of the answers are therefore akin to wimps groveling before Hitler. Indeed, to push the analogy, I would say rather that we are Churchillian rather than Chamberlain-like. When Hitler attacked Russia, England and America gave aid to Stalin. It was not that they particularly liked Stalin or his system, but they worked on the principle that the enemy of my enemy is my friend.

Fundamentalism, creationism, intelligent design theory—these are the real threats. Please God—or non-God—let us



Thank Goodness!

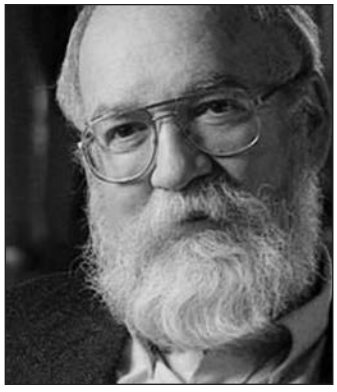
What happens after a noted atheist philosopher undergoes harrowing emergency heart surgery? Does he have an epiphany? And whom does he thank? Some reflections on life, prayer (other peoples'), and medicine.

DANIEL C. DENNETT

There are no atheists in foxholes according to an old but dubious saying, and there is at least a little anecdotal evidence in favor of this saying in the notorious cases of famous atheists who have emerged from near-death experiences to announce to the world that they have changed their minds. The British philosopher Sir A. J. Ayer, who died in 1989, is a fairly recent example. But I have another anecdote to ponder.

Two weeks ago,* I was rushed by ambulance to a hospital where it was determined by CT scan that I had a "dissection of the aorta." The lining of the main output vessel carrying blood from my heart had been torn, creating a two-channel pipe where there should be only one. Fortunately for me, the

fact that I'd had a coronary artery bypass graft seven years ago probably saved my life. The tangle of scar tissue that had grown, like ivy, around my heart in the intervening years had reinforced the aorta, preventing catastrophic leakage from the tear itself. During a nine-hour surgery, my heart was stopped entirely and my body and brain were chilled down to about forty-five degrees to prevent brain damage from lack of oxygen until they could get the heart-lung machine pumping. I am now the proud owner of a new aorta and aortic arch, made of strong Dacron fabric tubing sewn into shape—on the spot—by the surgeon, and attached to my heart by a carbon-fiber valve that makes a reassuring little click every time my heart beats.


Daniel C. Dennett

As I now enter a gentle period of recuperation, I have much to reflect on, not only about the harrowing experience itself, but even more about the flood of supporting messages I've received since word got out about my latest adventure. Friends were anxious to learn if I had had a near-death experience, and if so, what effect it had had on my longstanding and public atheism. Had I had an epiphany? Was I going to follow in the footsteps of Ayer (who, recovering his aplomb, insisted a few days later "what I should have said is that my experiences have weakened, not my belief that there is no life after death, but my inflexible attitude towards that belief"), or was my atheism still intact and unchanged?

Yes, I did have an epiphany. I saw with greater clarity than ever before that when I say "Thank goodness!" it is not merely a euphemism for "Thank God!" I really do mean *thank goodness!* There is a lot of goodness in this world, and it is this fantastic human-made fabric of excellence that is genuinely responsible for the fact that I am alive today. It is a worthy recipient of the gratitude I feel today, and I want to celebrate that fact here and now.

To whom, then, do I owe my gratitude? To the cardiologist who has kept me alive and ticking for years, and who swiftly and confidently rejected the original diagnosis of nothing worse than pneumonia. To the surgeons, neurologists, anesthesiologists, and the perfusionist, who kept my systems going for many hours under daunting circumstances. To the dozen or so physician assistants, nurses, physical therapists, x-ray technicians, and a small army of phlebotomists so deft that you hardly know they are drawing your blood. The people who brought the meals, kept my room clean, did the mountains of laundry generated by such a messy case, wheeled me to x-ray, and so forth. These people came from Uganda, Kenya, Liberia, Haiti, the Philippines, Croatia, Russia, China, Korea, India—and the United States, of course—and I have never seen more impressive mutual respect, as they helped each other and checked each other's work. But for all their teamwork, this local gang could not have done their job without the huge background of contributions from others. I remember with gratitude my late friend and Tufts colleague, physicist Allan Cormack, who shared the Nobel Prize for his invention of the CT scanner. Allan—you have posthumously saved yet another life, but who's counting? The world is better for the work you did. Thank goodness. Then there is the whole system of medicine, both the science and the technology, without which the best-intentioned efforts of individuals would be roughly useless. So I am also grateful to the editorial boards and referees, past and present, of *Science*, *Nature*, *Journal of the American Medical Association*, *Lancet*, and all the other institutions of science and medicine that keep churning out improvements, detecting and correcting flaws.

Do I *worship* modern medicine? Is science my *religion*? Not at all; there is no aspect of modern medicine or science that I would exempt from the most rigorous scrutiny, and I can readily identify a host of serious problems that still need to be fixed. That's easy to do, of course, because the world of medicine and science is already engaged in the most obsessive, intensive, and humble self-assessments yet known to human institutions, and they regularly make the results of their self-examinations public. Moreover, this open-ended rational criticism, imperfect as it is, is the secret to the astounding success of these human enterprises. There are measurable improvements every day. If I had blasted my aorta a decade ago, there would have been no prayer of saving me. It's hardly routine today, but the odds of my survival were actually not so bad (only 33 percent of aortic dissection patients die in the first twenty-four hours after onset without treatment, but the odds worsen by the hour thereafter).

One thing particularly strikes me when I compare the medical world with the religious institutions I have been studying so intensively in recent years. One of the gentler, more supportive themes to be found in every religion is the idea that if you have good intentions, and are trying to do what (God says) is right, that is all anyone can ask. Not so in medicine! If you are wrong—especially if you should have known better—your good intentions count for almost nothing. And whereas taking a leap of faith by acting without further scrutiny of one's options is often celebrated by religions, it is considered a grave sin in medicine. A doctor who let his faith in his personal revelations lead him to engage in untested trials with human patients would be severely reprimanded, if not driven out of medicine altogether. There are exceptions, of course. A few swashbuckling, risk-taking pioneers are tolerated and, if they prove to be right, eventually honored, but they can exist only as rare exceptions to the ideal of the methodical investigator who scrupulously rules out alternative theories before putting his

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own into practice. Good intentions and inspiration are simply not enough.

In other words, whereas religions may serve a benign purpose by letting many people feel comfortable with the level of morality they themselves can attain, no religion holds its members to the high standards of moral responsibility that the secular world of science and medicine does! And I'm not just talking about the standards 'at the top'—among the surgeons and doctors who make life or death decisions every day. I'm talking about the standards of conscientiousness endorsed by the lab technicians and meal preparers, too. This tradition puts its faith in the *unlimited* application of reason and empirical inquiry, checking and re-checking, and getting in the habit of asking, "What if I'm wrong?" Appeals to faith or membership are never tolerated. Imagine the reception a scientist would get if he tried to suggest that others couldn't replicate his results because they just didn't share the faith of the people in his lab! And, to return to my main point, it is the goodness of this tradition of reason and open inquiry that I thank for my being alive today.

What, though, do I say to those of my religious friends (and yes, I have quite a few) who have had the courage and honesty to tell me that they have been praying for me? I have gladly forgiven them. There are few circumstances more frustrating than not being able to help a loved one in a direct way. I confess to regretting that I could not pray—at least not sincerely—for my friends and family in time of need. I appreciate the urge, however clearly I recognize its futility. I translate my religious friends' remarks readily enough into one version or another of what my fellow *brights* have been telling me: "I've been thinking about you, and wishing with all my heart"—another ineffective but irresistible self-indulgence—"that you come through this OK." The fact that these dear friends *have* been thinking of me in this way, and have taken an effort to let me know, is itself, without any need for a supernatural supplement, a wonderful tonic. These messages from my family and from friends around the world have been—literally in my case—heart-warming, and I am grateful for the boost in that they have produced in me. But I am not joking when I say that I have had to forgive my friends who said that they were *praying* for me. I have resisted the temptation to respond "Thanks, I appreciate it, but did you also sacrifice a goat?" I feel about this the same way I would feel if one of them said "I just paid a voodoo doctor to cast a spell for your health." What a gullible waste of money that could have been spent on more important projects! Don't expect me to be grateful, or even indifferent. I do appreciate the affection and generosity of spirit that motivated you, but wish you had found a more reasonable way of expressing it.

But isn't this awfully harsh? Surely it does the world no harm if those who can honestly do so pray for me! No, I'm not at all sure about that. For one thing, if they *really* wanted to do something useful, they could devote their prayer time and energy to some pressing project that they *can* do something about. For another, we now have quite solid grounds (e.g., the recently released Benson study at Harvard; see SI July/August 2006) for believing that intercessory prayer simply doesn't work. Anybody whose practice shrugs off that research is subtly undermining respect for the very goodness I am thanking. If you insist on keeping the myth of the effectiveness of prayer alive, you owe the rest of us a justification in the face of the evidence. Pending such a justification, I will excuse you for indulging in your tradition; I know how comforting tradition can be. But I want you to recognize that what you are doing is morally problematic at best. If you would even *consider* filing a malpractice suit against a doctor who made a mistake in treating you, or suing a pharmaceutical company that didn't conduct all the proper control tests before selling you a drug that harmed you, you must acknowledge your tacit appreciation of the high standards of rational inquiry to which the medical world holds itself, and yet you continue to indulge in a practice for which there is no known rational justification at all, and take yourself to be actually making a contribution. (Try to imagine your outrage if a pharmaceutical company responded to your suit by blithely replying, "But we prayed good and hard for the success of the drug! What more do you want?")

The best thing about saying "thank goodness" in place of "thank God" is that there really are lots of ways of repaying your debt to goodness—by setting out to create more of it for the benefit of those to come. Goodness comes in many forms, not just medicine and science. Thank goodness for the music of, say, Randy Newman, which could not exist without all those wonderful pianos and recording studios. Thank goodness for fresh drinking water in the tap, and food on our table. Thank goodness for fair elections and truthful journalism. If you want to express your gratitude to goodness, you can plant a tree, feed an orphan, buy books for schoolgirls in the Islamic world, or contribute in thousands of other ways to the manifest improvement of life on this planet.

Or you can thank God—but the very idea of repaying God is ludicrous. What could an omniscient, omnipotent being (the Man Who Has Everything?) do with any paltry repayments from you? (And besides, according to the Christian tradition God has already redeemed the debt for all time, by sacrificing his own son. Try to repay *that* loan!) Yes, I know, those themes are not to be understood *literally;* they are symbolic. I grant it, but then the idea that by praying to God you are actually doing some good has got to be understood to be just symbolic, too. I prefer real good to symbolic good. Still, I excuse those who pray for me. I see them as like tenacious scientists who resist the evidence for theories they don't like long after a graceful concession would have been appropriate. I applaud you for your loyalty to your own position—but remember: loyalty to tradition is not enough. You've got to keep asking yourself: What if I'm wrong? In the long run, I think religious people can be asked to live up to the same moral standards as secular people in science and medicine.

Note: *This essay was completed November 10, 2006. □

Science's Vast Cosmic Perspective Eludes Religion

An excerpt from the new book
The Varieties of Scientific Experience: A Personal View of the Search for God.

CARL SAGAN

The image on the following page is meant to convey just a little sense of how many galaxies there are. We are looking out of the plane of the Milky Way Galaxy in the direction of the Hercules cluster. What we are seeing here are more galaxies beyond the Milky Way. (In fact, there are more galaxies in the universe than stars within the Milky Way Galaxy.) Most of the objects you see here are not stars but galaxies; spiral ones seen edge on, elliptical galaxies, and other forms. The number of external galaxies beyond the Milky Way is at least in the thousands of millions and perhaps in the hundreds of thousands of millions, each of which contains a number of stars more or less comparable to that in our own Galaxy. So if you multiply out how many

The Hercules cluster of galaxies (©Jim Misti [Misti Mountain Observatory], used in The Varieties of Scientific Experience)

stars that means, it is some number—let's see, ten to the . . . it's something like one followed by twenty-three zeros, of which our sun is but one. It is a useful calibration of our place in the universe. And this vast number of worlds, the enormous scale of the universe, in my view has been taken into account, even superficially, in virtually no religion, and especially no western religions.

Now, I've not shown you images of our own tiny world, nor did Thomas Wright. He wrote, "To what you have said about my having left out my own habitation in my scheme of the universe, having traveled so far into infinity as but to lose sight of the Earth, I think I may justly answer, as Aristotle did when Alexander, looking over a map of the world, inquired of him for the city of Macedon, 'tis said the philosopher told the prince that the place he sought was much too small to be there taken notice of and was not without sufficient reason omitted.

Carl Sagan (1934–1996) was a professor of astronomy and space sciences and director of the Laboratory for Planetary Studies at Cornell University. This an excerpt from The Varieties of Scientific Experience: A Personal View of the Search from God*, edited by Ann Druyan (Penguin Press, New York, November 2006), based on the 1985 Gifford Lectures in Scotland, by permission of Ann Druyan.*

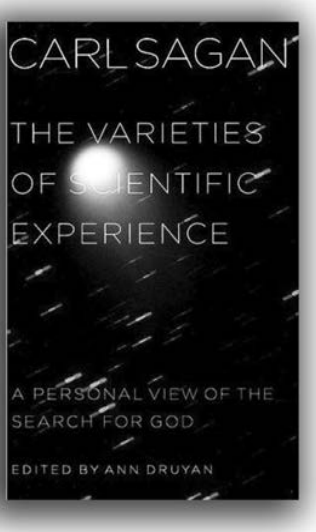
The system of the Sun," Wright goes on, "compared but with a very minute part of the visible creation takes up so small a portion of the known universe that in a very finite view of the immensity of space I judged the seat of the Earth to be of very little consequence."

This perspective provides a kind of calibration of where we are. I don't think it should be too discouraging. It is the reality of the universe we live in.

Many religions have attempted to make statues of their gods very large and the idea, I suppose, is to make us feel small. But if that's their purpose, they can keep their paltry icons. We need only look up if we wish to feel small. It's after an exercise such as this that many people conclude that the religious sensibility is inevitable. Edward Young, in the eighteenth century, said, "An undevout astronomer is mad," from which I suppose it is essential that we all declare our devotion at risk of being adjudged mad. But devotion to what?

All that we have seen is something of a vast and intricate and lovely universe. There is no particular theological conclusion that comes out of an exercise such as the one we have just gone through. What is more, when we understand something of the astronomical dynamics, the evolution of worlds, we recognize that worlds are born and worlds die, they have lifetimes just as humans do, and therefore that there

is a great deal of suffering and death in the cosmos if there is a great deal of life. For example, we've talked about stars in the late stages of their evolution. We've talked about supernova explosions. There are much vaster explosions. There are explosions at the centers of galaxies from what are called quasars. There are other explosions, maybe small quasars. In fact, the Milky Way Galaxy itself has had a set of explosions from its center, some 30,000 light-years away. And if, as I will speculate later, life and perhaps even intelligence is a cosmic commonplace, then it must follow that there is massive destruction, obliteration of whole planets, that routinely occurs, frequently, throughout the universe.



Well, that is a different view than the traditional Western sense of a deity carefully taking pains to promote the wellbeing of intelligent creatures. It's a very different sort of conclusion that modern astronomy suggests. There is a passage from Tennyson that comes to mind: "I found Him in the shining of the stars, I marked Him in the flowering of His fields." So far pretty ordinary. But, Tennyson goes on, "In His ways with men I find him not. Why is all around us here as if some lesser god had made the world but had not force to shape it as He would?"

To me personally, the first line, "I found Him in the shining of the stars," is not entirely apparent. It depends on who the Him is. But surely there is a message in the heavens that the finiteness not just of life but of whole worlds, in fact of whole galaxies, is a bit antithetical to the conventional theological views in the West, although not in the East. And this then suggests a broader conclusion. And that is the idea of an immortal Creator. By definition, as Ann Druyan has pointed out, an immortal Creator is a cruel god because He, never having to face the fear of death, creates innumerable creatures who do. Why should He do that? If He's omniscient He could be kinder and create immortals, secure from the danger of death. He sets about creating a universe in which at least many parts of it and perhaps the universe as a whole, dies. And in many myths, the one possibility the gods are most anxious about is that humans will discover some secret of immortality or even, as in the myth of the Tower of Babel, for example, attempt to stride the high heavens. There is a clear imperative in Western religion that humans must remain small and mortal creatures. Why? It's a little bit like the rich imposing poverty on the poor and then asking to be loved because of it. And there are other challenges to the conventional religions from even the most casual look at the sort of cosmos I have presented to you.

Let me quote a passage from Thomas Paine from *The Age of Reason*. Paine was an Englishman who played a major role in both the American and French Revolutions. "From whence," Paine asks, "From whence then could arise the solitary and strange conceit that the Almighty, who had millions of worlds equally dependent on His protection, should quit the care of all the rest and come to die in our world because, they say, one man and one woman ate an apple? And on the other hand, are we to suppose that every world in the boundless creation had an Eve, an apple, a serpent, and a Redeemer?"

Paine is saying that we have a theology that is Earth-centered and involves a tiny piece of space and when we step back, when we attain a broader cosmic perspective, some of it seems very small in scale. And in fact a general problem with much of Western theology in my view is that the God portrayed is too small. It is a god of a tiny world and not a god of a galaxy, much less of a universe.

Now, we can say, "Well, that's just because the right words weren't available back when the first Jewish or Christian or Islamic holy books were written." But clearly that's not the problem; it is certainly possible in the beautiful metaphors in these books to describe something like the Galaxy and the universe, and it isn't there. It is a god of one small world; a problem, I believe, that theologians have not adequately addressed.

Now, I don't propose that it is a virtue to revel in our limitations. But it's important to understand how much we do not know. There is an enormous amount we do not know; there is a tiny amount that we do. But what we do understand brings us face to face with an awesome cosmos that is simply different from the cosmos of our pious ancestors.

Does trying to understand the universe at all betray a lack of humility? I believe it is true that humility is the only just response in a confrontation with the universe, but not a humility that prevents us from seeking the nature of the universe we are admiring. If we seek that nature, then love can be informed by truth instead of being based on ignorance or self-deception. If a Creator God exists, would He or She or It or whatever the appropriate pronoun is, prefer a kind of sodden blockhead who worships while understanding nothing? Or would he prefer his votaries to admire the real universe in all its intricacy? I would suggest that science is, at least in part, informed worship. My deeply held belief is that if a god of anything like the traditional sort exists, then our curiosity and intelligence are provided by such a god. We would be unappreciative of those gifts if we suppressed our passion to explore the universe and ourselves. On the other hand, if such a traditional god does not exist, then our curiosity and our intelligence are the essential tools for managing our survival in an extremely dangerous time. In either case, the enterprise of knowledge is consistent surely with science; it should be with religion, and it is essential for the welfare of the human species. □

The Coulter Hoax
How Ann Coulter Exposed the Intelligent Design Movement

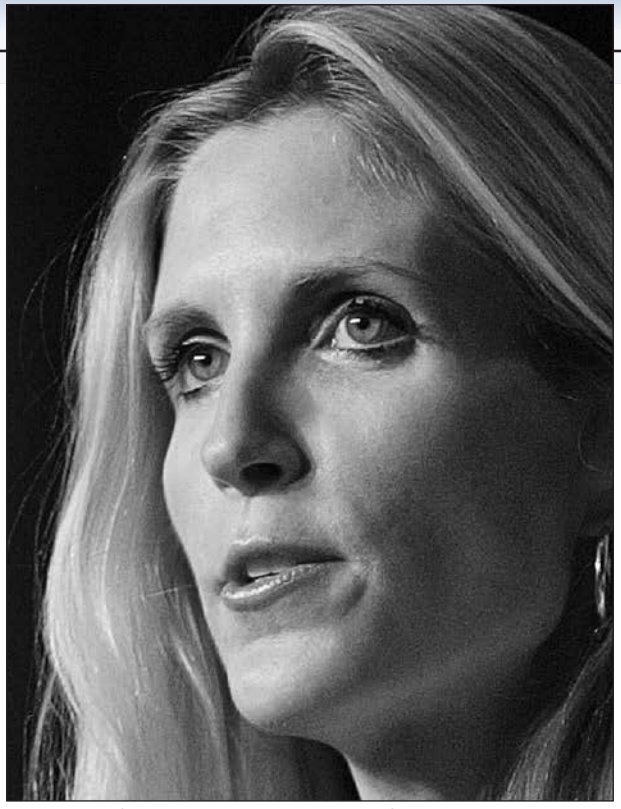
Ann Coulter's treatment of evolutionary biology in her book Godless *is best interpreted as a hoax, providing a scathing satire of the antievolution community.*

PETER OLOFSSON

In the summer of 2006, I heard that a new book called *Godless* presented an insightful and devastating criticism of the theory of evolution. Although I learned that its author, Ann Coulter, is not a scientist but a lawyer turned author and TV pundit, she nevertheless appeared to be an intelligent and well-educated person, so I started reading. At first I was puzzled. There did not seem to be anything new; only tired and outdated antievolution arguments involving moths, finches, and fruit flies. But it wasn't until Coulter dusted off the old Piltdown man story that I suddenly realized: it was a hoax! And it was brilliant.

Coulter has very cleverly written a fake criticism of evolution, much like the way NYU physicist Alan Sokal in 1996

published a fake physics article in a literary journal, an affair that has become known as the "Sokal hoax." A self-proclaimed "old unabashed leftist," Sokal was disturbed by the sloppily antiscientific, postmodernistic mentality that had started to replace reason and rationality within the academic left and ingeniously made his point by managing to get his nonsense article published by the very people he wished to expose. Coulter's aim at antiscience is at the other end of the political spectrum. An equally unabashed rightist, she is apparently disturbed by how factions within the political right abandon their normally rational standards when it comes to the issue of evolution. However, whereas Sokal revealed his hoax in a separate article, Coulter challenges her readers to find out the truth for themselves. Without claiming to do justice to Coulter's multifaceted and sometimes subtle satire, I will attempt to outline some of her most amusing and salient points.


Ann Coulter (Credit: Carrie Devorah / WENN)

Intelligent Design and Astrology

The attacks on evolution these days come not so much from traditional creationists, adhering to the literal interpretation of Genesis, as from proponents of intelligent design (ID), the notion that some biological systems are so complicated that they must have been designed. Unlike creationists, the ID proponents refuse to identify the designer; in particular, they do not mention God. As a matter of fact, design is only defined as "anything else but chance."

A problem with ID that has been pointed out over and over is that it isn't much of a scientific theory, as it does not attempt to explain anything, only criticize evolutionary biology. Coulter makes this point subtly. She nicely summarizes the theory of evolution by listing the main driving forces, mutation and natural selection, and the conclusion, creation of new species. And the corresponding summary of ID? Absent! Admirably clever.

Two of the most vehement ID advocates are Michael Behe and William Dembski. Behe is a professor of biochemistry at Lehigh University and one of very few ID proponents who is actually a scientist with an established research record. In 1996 Behe published *Darwin's Black Box*, which claims to present a biochemical challenge to evolutionary biology, a claim that has been thoroughly opposed, for example, by Brown University biology professor Kenneth Miller. It is hard for most of us to follow the technical arguments, but Behe would be the first to admit (and in fact does so on his academic Web site) that he is very lonely among his peers in advocating ID.

Coulter makes fun of Behe by vastly exaggerating his claims. For example, she claims that Behe has "disproved evolution" by demonstrating it to be a "mathematical impossibility." The truth is that Behe, who has no expertise in mathematics, accepts much of evolutionary theory.

On occasion, Coulter's satire is quite esoteric. Such is the case when she states, "Behe disproved evolution—unless evolution is simply a nondisprovable pseudoscience, like astrology." To understand the subtle linking of Behe to astrology, one must be familiar with Behe's testimony in the Dover trial in which he had to concede that if intelligent design was accepted as science, one must also accept astrology.

The other front figure, William Dembski, is a research professor in philosophy at Southwestern Baptist Theological Seminary in Fort Worth, Texas. I think Coulter is perhaps overly sarcastic when she lists his background: doctorate in mathematics, master of divinity degree, postdoctoral work in mathematics, physics, and computer science.

The sarcasm here is that Coulter lists postdoctoral positions in physics, mathematics, and computer science, but when one looks up Dembski's publication record, none of these positions led to any published research. In fact, Dembski has published precisely one original research article in a reputable journal: a 1990 paper on probability theory. Coulter goes on to refer to Dembski's "complicated mathematical formulas" and "statistical models" and jokes that there is yet no serious response. In reality, the few mathematicians who have bothered examining Dembski's mathematics have been completely unimpressed. A nice summary and evaluation of Dembski's oeuvre was written for the Dover trial by renowned mathematician Jeffrey Shallit.

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Shallit's conclusion in one word: pseudomathematics.

The Return of Mr. Piltdown

Arguments against evolution have not evolved much. Coulter illustrates this fact by repeating many old antievolution arguments, some of which are wrong, some of which are irrelevant, and some of which are both. I will only briefly touch upon three: the Piltdown man, the peppered moth, and the fossil record.

The Piltdown man has been a favorite in the antievolution camp for a long time. A fake fossil composed of a human skull and the jaw bone of an ape, the Piltdown man was "discovered" in 1912, and it was not until 1953 that the hoax was revealed. Was it then exposed by a team of lawyers led by Reverend Fred Phelps of Kansas? No such thing. The fraud was exposed by scientists, doing what they usually do: trying to figure out the truth. Moreover, there was no crisis in the scientific community. In fact, quite the opposite was true, as the Piltdown man was mostly regarded as an anomaly that did not fit into the evolution of man, and everybody was glad to see him gone. Coulter's joke consists of the mere mention of good old Mr. Piltdown, who obviously cannot in any way be used as an argument against evolution.

The peppered moth is a famous example of natural selection. During the industrial revolution in England, the light-colored variety of the moth started being replaced by a dark variety that was better camouflaged against predators as soot from the burning of coal started coating the countryside. This logical and seemingly innocent example has not escaped the ire of ID proponents. Coulter makes fun of the irrelevant complaint that the famous photos of the moths that have appeared in many biology books were staged. But, of course, one can stage a photo for the purpose of comparison, just like a Photoshop job could put Coulter next to Johnny Winter to compare a lawyer from Connecticut and a blues guitarist from Texas.

As for the fossil record, finally, Coulter bluntly states that it carries "no evidence" and supports this claim by jokingly referring to the authority of a Phillip Johnson, who is a lawyer!

A Gigantic Conspiracy?

If evolutionary theory is not a legitimate science, it must be the biggest scam the world has ever seen. By referring to "pseudoscience" and biology teachers "lying to your children," Coulter makes fun of the conspiracy theorists in the antievolution crowd. It's all a gigantic worldwide cover-up (probably orchestrated by the same people who blew up the World Trade Center and the levees in New Orleans, and tried to blame "terrorists" and a "hurricane"). It includes not only university professors and researchers but high-school teachers, science reporters, and Alex Trebek. And not only in America; the conspiracy is worldwide. It is nothing short of a miracle how well organized it is.

Coulter also has some fun with the common debating trick "*reductio ad Hitlerum*," the idea that any argument is invalidated if it can be somehow linked to Hitler. In the case of evolution, the argument comes in handy in claiming that Nazism is a logical consequence of belief in evolution and that the latter must therefore be flawed science.

This argument is silly in many ways. First, the validity of a scientific theory does not hinge upon how it has been interpreted by German dictators. And second, a scientific theory is not an ideology; it aims at explaining nature, not telling us what to do. Evolutionary biology did not oblige Hitler to kill Jews any more than nuclear physics mandates Kim Jong-Il to acquire the atomic bomb. And the theory of gravity does not require that you go jump off a bridge.

What about God Then?

Evolutionary biology is no more an atheistic theory than is nuclear physics, relativity theory, or astronomy. Famous British evolutionary biologist Richard Dawkins is an atheist, the previously mentioned Kenneth Miller is a Catholic, and Michael Behe stated during the Dover trial that Darwin's theory of evolution is not at all inconsistent with his private religious beliefs. Inserting mystical or religious explanations for natural phenomena is not new and did not even escape the great Isaac Newton. He believed that the solar system was unstable and required the occasional touch of the hand of God to stay in order. Later, the French scientist Pierre-Simon Laplace showed that the solar system was indeed stable without the hand of God. By that time, Newton was long dead but would easily have accepted Laplace's theory about the solar system without losing his faith that God was ultimately responsible for its creation.

The tale of Newton and Laplace brings us to the question why there is, in some circles, such fear of science. Coulter points out that no science is frightening to Christians, thus encouraging people to accept that scientific results are not a threat to their faith. I certainly agree. Richard Dawkins and Kenneth Miller disagree about God's existence, and it is up to you to decide with whom you agree. However, when it comes to evolutionary biology, they agree and they know what they are talking about. It is unfortunate that some people are so insecure in their faith that they fear their own intellects, especially as the concept of man's free choice is central in Christian theology, making it perfectly logical that God has created the world so that we can explain it without assuming Him as a hypothesis. Coulter offers these encouraging words: "Of course it's possible to believe in God and in evolution" and "If evolution is true, then God created evolution."

In conclusion, Coulter has written a biting satire over the trend of anti-intellectualism that clouds part of the conservative ideology, which is otherwise based on principle and reason. If I have any objection to Coulter's piece, it would be that it is a bit lengthy, but perhaps this too is part of the satire, as some antievolution pieces tend to be pretty verbose. There are also some things I don't fully understand, for example several references to bestiality and some seemingly nonsequitur remarks about Cher and Elton John. Considering how won-

Prayer

A Neurological Inquiry

Are silent prayers transmissible to, or readable by, a supernatural being? A brief examination of this question using modern information about the brain.

DAVID C. HAAS

A prayer is, according to *The New Shorter Oxford English Dictionary*, "a solemn request to God or an object of worship; a supplication, thanksgiving, or other verbal or mental act addressed to God." Petitionary prayers—*messages* seeking help or guidance for particular concerns—are common among Christians. They are also a feature of some other religions, such as Islam (Bouquet 1956) and Judaism where prayers expressing devotion and submission to almighty God prevail. But even these are intended communions with God. Although prayers are addressed to a supernatural being, prayer is an empirical behavior and thus accessible to scientific investigation.

Much prayer is silent (mental prayer). Silent praying is silent thinking, which "is really conducted largely in unspoken words" (Langer 1970) and which occupies a large part of our everyday lives (Bronowski 1978), a fact that attests to the enormous importance of language to human thought. So, silent prayers are simply *verbal thoughts* addressed to a god. Could therefore such thoughts be known to a supernatural being?

I explore this question in the following sections using modern information on mind and brain.

Although we all silently talk to ourselves a good deal (carry on internal dialogues), not all thoughts are verbal. Some are visual or auditory. We visualize people and places every day and often recall tunes from music we like. Thoughts are commonly mixtures of these and other types, often accompanied by emotions. Thoughts are mental phenomena, states of *mind*. But what then is *mind*?

The concept of mind encompasses our conscious mental life, including not only thoughts, but also perceptions, such as seeing and hearing; sensations, such as touch and cold; feelings, such as pain; and emotions (Sherrington 1951; Harth 1983; Harth 1993; Crick 1995). The brain is the organ of mind; it generates all that is mental. A few examples illustrate. A stroke that destroys the left occipital lobe deletes vision in the right visual field. Brain degeneration from Alzheimer's disease causes progressive impairment of memory, reasoning, and other mental attributes. Intoxication of the brain produces well-known mental impairments. Electrical stimulation of the exposed human cortex can evoke images and sounds, and even a virtual reliving of past experiences (Penfield and Roberts 1959). Modern brain-imaging techniques, such as functional magnetic-resonance imaging, have connected certain mental states with heightened activity in specific brain regions (Kamitani and Tong 2005; Binder, et al. 2005; Ishai, et al. 2005).

How brain activity generates mental states is as much of an enigma today as it was more than a half-century ago when the great neurophysiologist Charles Sherrington (1951) said in wonder, "How can a reaction in the brain condition a reaction in the mind?" More recently, the physicist Erich Harth (1983) expressed this enigma when he wrote "Mind is like no other property of physical systems. It is not just that we don't know the mechanisms that give rise to it. We have difficulty seeing how *any* mechanism can give rise to it."

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Transmission and Readability of Prayers

The brain, an electrochemical organ, consists of matter and energy, but the mental states that are the epiphenomena of its physiological processes are neither material substances nor forms of energy. Sherrington (1951) expressed this "scientific position" in saying, "Thoughts, feelings, and so on are not amenable to the energy (matter) concept. They lie outside it." If thoughts—including silent prayers—are not a form of energy, then there is no known natural means by which they could be transmitted beyond ourselves or read within us.

Still, many credulously believe that some people (especially so-called "psychics") can read minds and that thoughts can be transmitted from one person to another by mental telepathy or "extrasensory perception" (ESP). Perhaps this belief has been fostered by the seemingly substantive and energetic presence of our thoughts. But numerous experiments during some 150 years of research have not validated ESP and have left a wake of spurious statistical analyses (Lilienfeld 1999; Paulos 1990).

Though thoughts and prayers are neither transmissible nor readable by any natural means, could they be known to a supernatural being? Evidence for or against this can be obtained by determining whether prayers are followed by what was solicited by them. Only proper scientific studies, however, can provide reliable evidence by excluding chance occurrences, and biases from the results. To this end, a number of such studies have measured the effects of *intercessory prayer* (praying for others) on health-care outcomes in patients with various illnesses. A thorough review of the medical literature in 2000 concluded that the data were inconclusive (Roberts, et al. 2000). Since then, at least five studies have been published, the most recent in April 2006 (Benson, et al. 2006). All found no beneficial effect of intercessory prayer. (See also Bruce Flamm, "One Big STEP: Another Major Study Confirms That Distance Prayers Do Not Heal the Sick," SKEPTICAL INQUIRER, July/August 2006.)

Transmission and Detection of Brain Activity

In contrast to thoughts, the brain activity underlying them consists of (electrochemical) energy. Could this energy be transmitted from us or be detected within us? If so, would it have the informational content of the thoughts arising from it? This activity, in brief, is the sending and receiving of electrochemical impulses among the brain's densely packed microscopic neurons, which number in the tens of billions in the highly enfolded human cortex (Crick 1995). The impulses ("nerve action potentials") sent by a neuron can be picked up by a microelectrode within 100 micrometers of it in the cortex. These impulses have amplitudes of several millivolts (Brecht, et al. 2004). Electrodes on the surface of the brain are, however, too distant to detect them, but can record synchronized fluctuations of electrical potentials in masses of cortical neuronal dendrites (branches receiving incoming impulses). These post-synaptic potentials vary in amplitude from about 0.5 to 1.5 millivolts, but when recorded on the scalp their amplitudes are only about 10 to 50 microvolts. The ionic (largely sodium and potassium) movements responsible for these voltage fluctuations can not be recorded outside the scalp, for their detection requires a medium affected by ionic movements. But these electrical potentials, like all moving electric charges, generate magnetic fields, which pass through the skull. They are, however, extremely weak (about 50×10^{-15} Tesla), some nine orders of magnitude less than Earth's magnetic field and as much as six orders below ambient magnetic noise (Volegov, et al. 2004). Thus, they can be recorded only by special sensors on the scalp in shielded rooms (Volegov, et al. 2004).

No one would suggest that these electromagnetic energies represent more than a smidgen of the neural activity underlying thoughts, which presumably includes repetitive firing of action potentials in neural circuitry containing millions of cortical and sub-cortical neurons (Harth 1993). Even if this immeasurable activity could be captured, seemingly insurmountable difficulties would prevent its translation into thoughts. To begin with, the translation would need to be simultaneous with the flow of thoughts as well as in the language of the thinker, for a full thought *is* its verbal expression. In view of what is known of brain development and organization (Harth 1993), the neural patterns underlying any thought, even a formulary prayer, would be unique for every individual. Thus, generic translations from neural patterns to verbal thoughts in any language would be impossible. A supernatural being would need to instantly surmount these difficulties—for multitudes of concurrent supplicants—in order to grasp the informational content of a mental prayer. Moreover, such a being would, logically, need to be with each supplicant while he or she is rotating with Earth at 1,038 miles per hour (if at the equator), orbiting around the Sun at 18.5 miles per second, rotating around the center of the Milky Way at about 150 miles per second, and moving through space with our galaxy at some thousands of miles per second.

Like all mental states, prayers are neither matter nor energy. Thus, they are not transmissible to or readable by another being by any means within the laws of nature.

Whether they can be known to a supernatural being hinges on the effects of the prayers' solicitations as judged by proper scientific studies. To date, such studies of intercessory prayer have not shown it to improve health-care outcomes. In contrast to thoughts themselves, the brain activity from which thoughts arise does consist of energy—electrochemical energy within neural circuitry. Reading this teeming energy in millions of circuit neurons and translating it into the thought or prayer arising from it seems theoretically impossible for even a supernatural being.

Like all mental states, prayers are neither matter nor energy. Thus, they are not transmissible to or readable by another being by any means within the laws of nature.

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Bible Stories
A Sociologist Looks at Implausible Beliefs in Genesis

The ongoing debate between scientists and creationists has ignored the contradictions contained in Genesis.

ALLAN MAZUR

Proponents of intelligent design (ID) and evolution each try to undermine the other's position. Strangely absent from the contemporary debate is any critique of the Bible itself. ID is, after all, simply a "nonreligious" framing of divine creation as expressed in Genesis. Who else but God would the intelligent designer be?

The opening pages of Genesis actually contain two different and inconsistent versions of creation. One tells the events of seven days; the other is a tale about Adam and Eve.

Seven Days

Here is the story as found in Genesis 1:1 to 2:3 of The Holy Bible, New Revised Standard Edition.

In the beginning when God created the heavens and the earth, the earth was a formless void and darkness covered the face of the deep, while a wind from God swept over the face of the waters. And God said, "Let there be light"; and there was light. And God saw that the light was good; and God separated the light from the darkness. God called the light Day, and the darkness he called Night. And there was evening and there was morning, the first day.

And God said, "Let there be a dome in the midst of the waters, and let it separate the waters from the waters." So God made the dome and separated the waters which were under the dome from the waters which were above the dome. And it was so. And God called the dome Sky. And there was evening and there was morning, the second day.

And God said, "Let the waters under the sky be gathered together into one place, and let the dry land appear." And it was so. God called the dry land Earth, and the waters that were gathered together he called Seas. And God saw that it was good. And God said, "Let the earth put forth vegetation, plants yielding seed, and fruit trees bearing fruit in which is their seed, each according to its kind, upon the earth." And it was so. The earth brought forth vegetation; plants yielding seed, and fruit trees of every kind on earth that bear fruit with the seed in it." And it was so. The earth brought forth vegetation: plants yielding seed of every kind, and trees of every kind bearing fruit with the seed in it. And God saw that it was good. And there was evening and there was morning, the third day.

And God said, "Let there be lights in the dome of the sky to separate the day from the night; and let them be for signs and for seasons and for days and years, and let them be lights in the dome of the sky to give light upon the earth." And it was so. God made the two great lights—the greater light to rule the day and the lesser light to rule the night—and the stars. And God set them in the dome of the sky to give light upon the earth, to rule over the day and over the night, and to separate the light from the darkness. And God saw that it was good. And there was evening and there was morning, the fourth day.

And God said, "Let the waters bring forth swarms of living creatures, and let birds fly above the earth across the dome of the sky." So God created the great sea monsters and every living creature that moves, of every kind, with which the waters swarm, and every winged bird of every kind. And God saw that it was good. God blessed them, saying, "Be fruitful and multiply and fill the waters in the seas, and let birds multiply on the earth." And there was evening and there was morning, the fifth day.

And God said, "Let the earth bring forth living creatures of every kind: cattle and creeping things and wild animals of the earth of every kind." And it was so. God made the wild animals of the earth of every kind, and the cattle of every kind, and everything that creeps upon the ground of every kind. And God saw that it was good.

Then God said, "Let us make humankind in our image, according to our likeness; and let them have dominion over the fish of the sea, and over the birds of the air, and over the cattle, and over all the wild animals of the earth, and over every creeping thing that creeps upon the earth." So God created humankind in his image, in the image of God he created them; male and female he created them. And God blessed them, and God said to them, "Be fruitful and multiply, and fill the earth and subdue it; and have dominion over the fish of the sea and over the birds of the air and over every living thing that moves upon the earth."

God said, "See, I have given you every plant yielding seed that is upon the face of all the earth, and every tree with seed in its fruit; you shall have them for food. And to every beast of the earth, and to every bird of the air, and to everything that creeps on the earth, everything that has the breath of life, I have given every green plant for food." And it was so. And God saw everything that he had made, and indeed, it was very good. And there was evening and there was morning, the sixth day.

Thus the heavens and the earth were finished, and all their multitude. And on the seventh day God finished his work that he had done, and he rested on the seventh day from all his work that he had done. So God blessed the seventh day and hallowed it, because on it God rested from all his work which he had done in creation.

Aspects of the story may seem peculiar. Evenings and mornings alternate for three days before there is a sun, and for the same reason plants and fruit trees initially grow without photosynthesis. The dome of the sky has water above it (different from clouds within it) as well as below. Perhaps to the ancient mind an invisible sea above the sky was the source of rainfall.

Bible scholars note the affinity of the opening passage of Genesis to *Enuma Elish*, a Mesopotamian creation myth dated to about 1100 B.C. (Freedman 1992, 526–528). This poem, written in cuneiform on seven tablets and named for its first words, was discovered in the ruins of the library of Ashurbanipal in Nineveh. The story, now known in different renditions, opens when there is no heaven or earth. Only the male god Apsu (fresh water) and the female god Tiamat (sea water) exist. Their mingling of waters produces other gods and [redacted]

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forming heaven and earth. Much of the narrative is concerned with discord and battle among the gods from which Marduk emerges as dominant. Along the way, celestial lights are placed in heaven, and Tiamat produces fearful animals to aid her struggle against other gods. Marduk heaps up mountains and opens springs to create the Tigris and Euphrates. He creates temples and the city of Babylon, and then makes man. The work of creation is finished within the first six tablets. The seventh tablet exalts the creation and greatness of Marduk's work.

Adam and Eve

The second creation story in Genesis (2:4–2:25), concerning Adam and Eve, immediately follows the account of seven days:

> In the day that Yahweh made the earth and the heavens, when no plant of the field was yet in the earth and no herb of the field had yet sprung up—for Yahweh had not caused it to rain upon the earth, and there was no one to till the ground; but a stream would rise up from the earth and water the whole face of the ground—then Yahweh formed man from the dust of the ground, and breathed into his nostrils the breath of life; and man became a living being. And Yahweh planted a garden in Eden, in the east; and there he put the man whom he had formed. Out of the ground Yahweh made to grow every tree that is pleasant to the sight and good for food, the tree of life also in the midst of the garden, and the tree of the knowledge of good and evil.
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> A river flowed out of Eden to water the garden, and there it divides and becomes four branches. The name of the first is Pishon; it is the one which flows around the whole land of Havilah, where there is gold; and the gold of that land is good; bdellium and onyx stone are there. The name of the second river is Gihon; it is the one that flows around the whole land of Cush. And the name of the third river is Tigris, which flows east of Assyria. And the fourth river is the Euphrates.
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> Yahweh took the man and put him in the Garden of Eden to till it and keep it. And Yahweh commanded the man, "You may freely eat of every tree of the garden; but of the tree of the knowledge of good and evil you shall not eat, for in the day that you eat of it you shall die."
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> Then Yahweh said, "It is not good that the man should be alone; I will make him a helper as his partner." So out of the ground Yahweh formed every animal of the field and every bird of the air, and brought them to Adam to see what he would call them; and whatever Adam called every living creature, that was its name. Adam gave names to all cattle, and to the birds of the air, and to every animal of the field; but for Adam there was not found a helper as his partner. So Yahweh caused a deep sleep to fall upon Adam, and while he slept took one of his ribs and closed up its place with flesh. And the rib that Yahweh had taken from the man he made into a woman and brought her to the man. Then Adam said, "This at last is bone of my bones and flesh of my flesh; she shall be called Woman, because she was taken out of Man." Therefore a man leaves his father and his mother and cleaves to his wife, and they become one flesh. And the man and his wife were both naked, and were not ashamed.

Of Genesis's two accounts of creation, I prefer the story of Adam and Eve. It has puzzles to ponder. Why did God so misunderstand his creation Adam as to offer an animal or bird as a suitable partner?

As in *Enuma Elish,* the Tigris and Euphrates place us in the Middle East. The rivers are said to branch from an outflow of the Garden of Eden. Since the headwaters of these two great rivers are in Turkey, that nation is the closest we can come to locating the biblical origin of humankind. Anomalously, the Mormons, following a revelation to founder Joseph Smith, locate the Garden of Eden in western Missouri (Brodie 1971).

We read of Eden as being "in the East," indicating the author's own location as west of the Tigris and Euphrates, plausibly in or near ancient Israel. We have no modern identification of the Pishon and Gihon Rivers, said to branch from the same source as the Tigris and Euphrates. These names may be fictitious, reflecting the "western" author's imperfect knowledge of Mesopotamia, or they may have been real rivers now lost through geological change.

Small details of text have come to have deep cultural meaning. Forming Adam "from the dust of the ground" evokes each person's life course: "ashes to ashes, dust to dust." Forming Eve from Adam's rib suggests to some readers that women are (or should be) subordinate to men.

Of Genesis's two accounts of creation, I prefer the story of Adam and Eve. It has characters with whom to empathize, and we can follow the family saga through subsequent passages. It has puzzles to ponder. Why did God so misunderstand his creation Adam as to offer an animal or bird as a suitable partner? Eve's creation seems to be a second attempt at partnering, after it became clear to Yahweh that no animal or bird would do. If the first attempt had worked, would there have been a Cain or Abel? Why was Eve made from one of Adam's bones instead of his hair or muscle or blood? Perhaps the reason is that skeletons are the most enduring remains of a body, and ribs are among the few redundant bones that, if taken away, would not leave Adam crippled, but a tooth might have done as well. One can speculate endlessly. There is no way to reach a correct answer except by faith or fiat.

Some traditionalists see the Bible's two stories of creation as a telescopic narrative, with the opening account giving the "big picture" while the story of Eden narrows the focus. Adam and Eve's tale is so engagingly different from the impersonal catalog of seven days that casual readers may not notice their contradictions. In the seven days story, all vegetation including seed plants and fruit trees is made on the fourth day. All sea creatures and flying birds are made on the fifth day. All land animals from cattle to creeping things are made on the sixth day, and afterward God makes humans—male and female—to

rule over these fish, birds, and animals, and to use the plants for food.

In the second story, Adam comes first "when no plant of the field was yet on the earth." Then plants are created in Eden. Then "out of the ground Yahweh formed every animal of the field and every bird of the air." Finally Eve is made from Adam's rib.

Early readers within both Hellenistic and rabbinic Judaism recognized these inconsistencies and considered how they might be reconciled. Some assumed the first-created human—"male and female"—was an androgyne, later split into Adam and Eve. The Alexandrian Jewish philosopher Philo thought the primal androgyne was without a body, and that humans with bodies described in Genesis 2 represented a separate act of creation (Boyarin 1993; 17, 38).[1]

Was the first man created before plants and animals and birds, or afterward? Did birds appear before land animals or at the same time? The sequences agree on only two points: (1) vegetation preceded animals and birds, and (2) the first woman was created at the end of the process. There is little correspondence between either of the biblical sequences and our modern understanding of life's history. Water animals such as trilobites are the earliest known fossils of complex organisms, appearing long before land plants. Plant and animal life was abundant on land before many kinds of fish appeared; and marine mammals including whales are quite recent. Land plants did precede land animals that fed on them, but seed plants and fruit trees (angiosperms) appeared after dinosaurs and small mammals had long roamed the earth. Birds followed dinosaurs. Humans—of both sexes—are the newest of the major kinds mentioned in Genesis (Fortey 1998).

Multiple Authorship

Literary scholars of the nineteenth century developed methods of text analysis focused on such questions as whether a single author did indeed write all of the works attributed to Shakespeare. Their method, very briefly, is to compare themes and writing styles of the different works, on the assumption that particular authors may be recognized by their unique and consistent forms of expression, grammar, choice of words, and punctuation. In Germany, scholars applied the same method to the Bible, not to undermine belief but to gain a better understanding of this holy text.

As illustration, compare the two versions of creation. We have already seen that they contradict one another in sequencing the appearance of life forms on earth. They also differ in overall style, one a log of seven days, perhaps derived from *Enuma Elish*, the other a tale that a bard might tell about specific people, Adam and Eve. There is in addition an important difference in referring to the deity. The seven days version speaks impersonally of "God" (in Hebrew *Elohim*). In the Adam and Eve tale, God is called by his personal name, Yahweh. In the seven days account, the words used for creation are derivatives of one Hebrew root; in the Adam and Eve account they are derived from a different root (Rofé 1999). There is a strong case that the two passages were written by different authors.

After nearly two centuries of research, most nonfundamentalist biblical scholars agree that Genesis is a composite, a merger of previously separate documents. The Adam and Eve tale that speaks of Yahweh is the opening portion of what is called the "Yahwist" or J document (for *Jahwist*, as German scholars spell it). The "seven days" version of creation begins what is called the "Priestly" or P document, because of its exceptional interest in priestly issues. Though each document may be consistent in itself, when juxtaposed they produce inconsistencies or explicit contradictions.

One need not accept the hypothesis of multiple authors to see the logical inconsistencies and physical absurdities in Genesis. We can at least say in favor of intelligent design that it is free of these particular problems. Perhaps we owe its formulators some thanks for moving us away from a 6,000-year-old earth, Adam and Eve, and the story of a few men who in months built with simple tools a boat sufficiently large to house and feed representatives of every species of animal that ever existed.

Note

1. See www.answersingenesis.org/home/area/faq/genesis.asp for examples of modern commentary that explain away inconsistencies between Genesis 1 and 2 by introducing novel English-to-Hebrew translations, ad hoc interpretation of words or phrases, or ignoring details in the text.

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Old-Time Religion, Old-Time Language

Jesus buried in Japan? Literal belief in the Tower of Babel? Hindu influence in the American Southwest? In the context of nonstandard claims by fringe scholars and revisionists about the remote past, religion and language are often intertwined.

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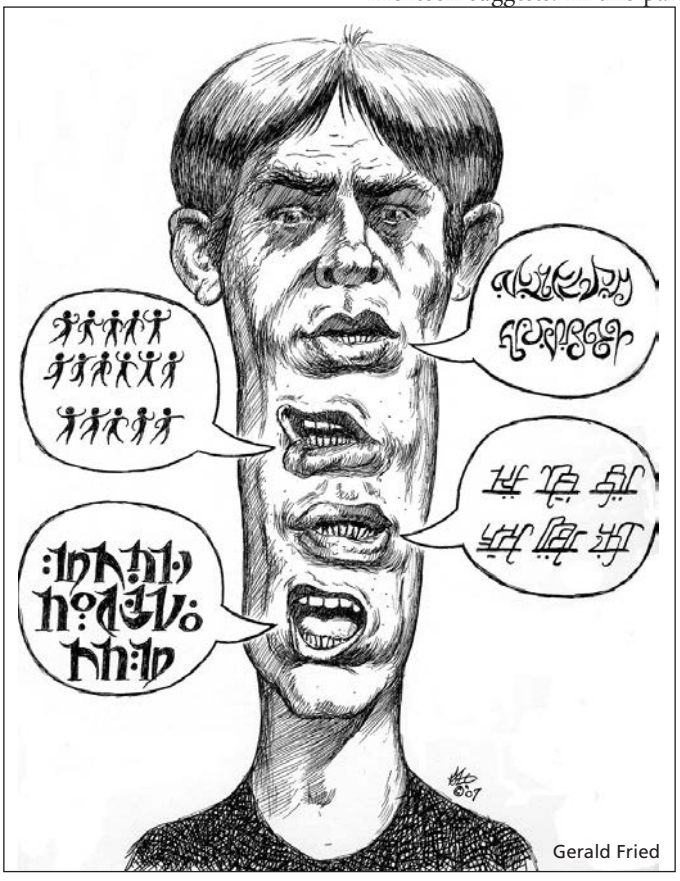
In the context of nonstandard claims about the remote past, the fields of religion and language are both highly significant but might superficially appear largely unconnected. However, there are a number of cases in which religious and linguistic issues are intertwined. This is not entirely surprising, since both religion and language are core elements in human culture and thought. Language is both a determining factor for human thought and its most articulated vehicle of expression. Many human groups regard their language as an identifying characteristic. Folk-linguistic beliefs often center on the origin of the language, treated as a key aspect of mythological/religious accounts of the origin of the group and its world. Positions on the two fronts are thus frequently connected.

Starting with Genesis

One instance of this phenomenon that is well known in the West is the Tower of Babel story in Genesis. This Hebrew myth explains the diversity of human languages in terms of an initial state involving a single language being ended by divine intervention in the relatively recent past. Of course, this is quite contrary to the modern scientific/linguistic position that humans have had language for at least 70,000 years and that diversification (and convergence) of languages have proceeded by way of "cultural evolution" throughout this period. As one might expect, those who still accept the story as literally true are motivated by fundamentalist Jewish or Christian belief in the literal inerrancy of Genesis, i.e., they are "creationists."



More surprisingly, some of these modern believers in the Tower of Babel are trained in linguistics. There are various branches of the Summer Institute of Linguistics (SIL) located around the world. SIL trains linguists in fieldwork methods, so that they can analyze unwritten languages worldwide, develop writing systems, prepare dictionaries and grammars—and translate the Bible into each such language, for this otherwise worthy enterprise is linked with Wycliffe Bible Translators, an arm of fundamentalist Christianity! Indeed, some of its qualified linguists and instructors are creationists. An example of their work is an article by Kevin May (2001), which essentially upholds the Babel story. For a qualified linguist, May is remarkably ill-informed on historical linguistics, and his summaries of orthodox views are wildly outdated. (This is, of course, often true of scientifically trained creationists.)

At a time when Genesis was generally interpreted as historical (which was before the development of historical linguistics), it was often assumed that the single pre-Babel language was Hebrew, the language of the Pentateuch. This idea is, in fact, far from dead. One current manifestation of it is the work of the Jewish creationist writer Isaac Mozeson (see Mozeson 2000 and his Web site at www.homestead.com/edenics). Mozeson claims that virtually all the words of all languages derive from "Edenic," which is basically early Hebrew with some (Proto-)Semitic roots not attested in Hebrew itself. (Hebrew is a member of the Semitic language family.) As is very common in such cases, the main problem with Mozeson's proposal involves the methods of comparative linguistics that he adopts. These are long outdated and are now used only by fringe amateurs. The probability of pairs of superficially similar words in apparently unrelated languages having very similar or the same senses by chance is in fact *much* higher than Mozeson suggests. In this particular case, most of the alleged correspondences between phonemes are unsystematic and arbitrary; each correspondence is invoked as it is needed to "explain" specific forms, but there is typically no good explanation for why different correspondences apply in different cases, or even an admission that this is an issue that needs to be addressed. It has long been known that language change does not occur in this unsystematic way: there are often exceptions to a given pattern of correspondences, but these are relatively few; and, where information is available, they can generally be explained. Using the methods adopted by Mozeson and other amateurs, one can "prove" (spuriously) that almost any two languages share large amounts of vocabulary. The statistics involved here have recently been formalized by Ringe (1992) and other historical linguists, and, while there is some debate about specifics, the overall case is overwhelming.

In addition, in many of the cases cited by Mozeson, other etymologies are already known or proposed with good evidence. His theory also contradicts a large amount of well-grounded information about the "genetic" relationships of

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entire languages (in language families). Further, the analysis ignores the fact that "genetic" relatedness (as opposed to influential contact) always involves specific elements of grammar and phonology as well as shared vocabulary. In fact, it is clear from a range of major errors that Mozeson simply does not understand historical linguistics.

On a linked Web site (www.ancient-hebrew.org), Jeff Benner argues (implausibly) that Hebrew script, which was clearly partly pictographic in origin, kept its pictographic function even after it became alphabetic and that the Hebrew language and its script must have appeared simultaneously when God created Adam with a mature knowledge of the spoken and written language (the argument shows that he's another creationist). In support of the former claim, he cites some fringe and semi-fringe writers, notably Fano (1992), who was one of the members of a mid-twentieth-century breakaway Italian school of *nonscientific* linguists influenced by the idealist philosophy of Croce (1902). Fano, in fact, rejected Croce's more extreme ideas but remained conspicuously nonmainstream in international terms.

Another fairly similar project is that of Brit-Am, a British-Israelite-like group led by Yair Davidy. But this group (naturally) focuses on alleged linguistic parallels between Hebrew and the Celtic languages. The parallels presented lack conviction for the same reasons noted above and also because of their reliance on outdated sources. (See, e.g., Davidy n.d., Brit-Am's quarterly journal *Tribesman*, works such as Brit-Am 2001, and the Brit-Am Web site, at www.nazarene.net/brit-am.) In the same way, the British Israelites proper implausibly proclaim linguistic connections between Hebrew, on the one hand, and both English and Welsh, on the other (see, e.g., J.C. James n.d., and S. Evans n.d.). British Israelite philology is especially bizarre. In recent times, the professional linguist Theo Vennemann (2001) and some relatively well-informed amateurs have actually argued seriously for early Semitic influence on Celtic, with better evidence; but even Vennemann's case is regarded as dubious.

Another, perhaps more arguable proposal is set out in Blodgett 1981. Blodgett, a lecturer on German and Hebrew, argues that Hebrew exerted major influence on Germanic languages in antiquity through the dispersion of the "Lost Tribes" of Israel into central Europe. He knows some historical linguistics (although he makes several undergraduate-level errors that are quite damaging). But even his case for this relatively modest revision of history simply does not have strong linguistic evidence.

A different revisionist approach to the Old or New Testament involves the relocation of the events described there away from Palestine to some other quite distant area, or the suggestion that biblical figures lived at times in remote places. For example, Jesus is said to have survived his crucifixion and to have relocated to Kashmir or Japan, eventually dying in one or the other. There is a linguistic aspect to the version involving Japan, centering on a temple chant used at Herai in northern Honshu, where the "Grave of Jesus" is exhibited (see also Mazza and Kardy 1998; Desmarquet 1993). Bergman (n.d.), on the Web claims that this chant is in fact in Hebrew, modified to fit Japanese phonology. It is also claimed that a document dating from around 100 A.D. and written in the *kana* syllabary (a series of simple symbols originally derived from Chinese characters that each now represent a specific Japanese syllable, regardless of meaning) is said to exist in the area, though this is several hundred years before *kana* are known to have existed. This text allegedly shows that Jesus is indeed buried in Herai and contains his will. But Bergman's reading of the chant can be made to seem plausible only by very special pleading. In twenty minutes, I devised a Latin reading that is closer to the Japanese phonetics than Bergman's Hebrew is and also fits the situation better (the presence of "Dark Age" missionaries in Japan). The most plausible analysis is still that this is a normal Japanese folk-chant with some sequences that display accidental, and only rather approximate, similarities to Hebrew words. And the key document is probably a nineteenth- or twentieth-century forgery.

Egyptian Hieroglyphics

There is a long nonmainstream tradition of reinterpreting the events related in Exodus. Notably, Akhenaten, the pharoah who converted the religion of ancient Egypt to a monotheistic form, and Moses are often linked or even identified as the same person or as closely related. Akhenaten's dynastic (non-immediate) successor Tutankhamun is also involved. The main relevant work with a linguistic element is *Secrets of the Exodus* (Sabbah and Sabbah 2002), which argues that the "chosen people" were in fact the Egyptians, who were conquered by the Hebrews and suffered under the rewriting of history by the victors (a common tale and not an entirely untrue one, albeit over-used by postmodernists and fringers). In this version, Moses was not Akhenaten but another pharaoh, Rameses I (while Akhenaten was Abraham!). Predictably, there are many problems here, but the linguistics are especially weak. The Sabbahs write as if the origin and development of the Hebrew *abjad* (consonantal alphabet) and other related Semitic scripts were only very sketchily known, with large gaps waiting to be filled by researchers such as them. They derive the *abjad* from key parts of hieroglyphs, each retaining much of its Egyptian pictographic significance (compare Benner above).

However, by dynastic times, the relevant Egyptian hieroglyphs had already lost this significance. The script was predominantly phonological, meaning each symbol, even if pictorial, now usually represented a consonant or longer sequence of phonemes, regardless of meaning. And the Semitic *abjad* scripts are undoubtedly closely connected with each other. There may well be an older Egyptian source for some of the Semitic letters; but if there is it involves this whole family of scripts, not just Hebrew. In fact, the evidence for the specific connections proposed—even where the words themselves are or may be related—is mostly impressionistic. Many cases involve special pleading or outright contrivance. It is easy to find accidental parallels between Hebrew letters and hieroglyph parts.

Another issue in this area is that of Latter-Day Saints

(LDS) sources (e.g., Larson 1992; Nibley 1988) continuing to promote the veracity of the "Reformed Egyptian" in their *Book of Abraham* and other texts associated with *The Pearl of Great Price*. See Smith (n.d.) for the original account on this otherwise unknown language. When the early LDS leaders claimed that this was the language on the plates the angel lent them to be mystically translated, very little was known about Egyptian, but nothing learned since has confirmed LDS ideas on this front. The small pieces of genuine Egyptian text presented in LDS sources were already known at the time and have subsequently been interpreted quite differently.

There are also LDS texts that seek to demonstrate the presence of languages and scripts used in ancient Israel in "inscriptions" found in the Americas and to relate known languages of the Americas to Hebrew (e.g., Harris 1998).

Bible Coders

In quite a different vein, Lucas and Washburn 1979 was something of a precursor to Michael Drosnin's *The Bible Code* (1997); in fact, there have been many such efforts to prove that the Bible or some other religious text is reliable by finding numerical or verbal patterns in the text which allegedly could not have come to be there by chance and which often carry important messages (prophecies, etc). The cases for these claims are typically much weaker in statistical terms than their proponents suggest (see the now familiar skeptical literature on Drosnin, including David E. Thomas's SKEPTICAL INQUIRER articles: "Hidden Messages and the Bible Code," November/December 1997; and "Bible Code Developments," March/April 1998.) But what has not always been made clear is that, in many cases, their linguistics are also less than competent. For instance, Lucas and Washburn—misinterpreting a reference work—claim that there are no rules at all for the use or nonuse of the Greek definite article, the equivalent of the English word *the*. (They therefore claim that God was free to include the article or not in each New Testament phrase, in order to make their numbers add up.) This is untrue.

Another writer who found hidden messages in the Bible was Max Freedom Long (1983). Long met Hawaiian *kahunas* with supposed psychic powers and came to believe that Jesus had studied in an ancient Polynesian mystical tradition called *Huna*, which had once prevailed in Egypt (he has some novel interpretations of hieroglyphs!) and elsewhere in the ancient world. Jesus and his apostles accordingly inserted secret messages in the texts of the Gospels, which are much more important than the overt message of the texts. These messages are in a secret language or "code" that is the ancestor of Polynesian (and is still spoken by a tribe in Morocco!). Confusingly, Long's specific claims often seem to involve current Hawaiian, not early Polynesian. He clearly did not know linguistics, and his interpretations require large amounts of special pleading if they are to be deemed remotely plausible.

Again in a different vein, Maxwell et al. 2000 is inspired by the late-nineteenth-century diffusionist writer Gerald Massey (1998), who believed he could trace all religions back to a small number of linked cults (stellar, lunar, and solar). Massey merged the genuine knowledge that was emerging from Egypt with the early modern fantasies—now largely debunked—about Egyptian mystery religions. Maxwell et al. focus mainly on the religious issues in the usual historical revisionist manner, finding a huge number of possible links but arguing persuasively for very few. However, they also present linguistic ideas taken from a three-volume work published around 1940, apparently anonymously (adding more examples of their own). This book has the overall title *Priesthood of the Ills* and contains a large amount of nonstandard philology, adduced as support for these diffusionist theories of religion. The author believes that there is a language conspiracy, which involves (a) keeping humanity divided by enforcing the use of many mutually unintelligible languages; and (b) blocking humanity from discovering the original ("true") meanings of words. This suggests that all changes in the meanings of words are illegitimate, which, of course, is nonsense. However, the author believes that the meanings of some of the key words in ancient languages were very different indeed from those of the English words normally used to translate them and that this has been deliberately concealed by the forces of evil. These "true" meanings are implicated in huge numbers of unrecognized links between languages. These writers suggest that simply focusing on pronunciation rather than spelling will enable one to hear which words are really connected, because they sound similar! Once again, the last 200 years of historical linguistic scholarship is simply ignored.

There have been many efforts to prove that the Bible or some other religious text is reliable by finding numerical or verbal patterns in the text which allegedly could not have come to be there by chance.

Hindu Creationism

As well as members of the Judeo-Christian tradition, some Hindu believers also adopt nonstandard views on language that relate closely to their fundamentalist religious views. These latter involve "Vedantic creationism," including the belief that modern humans have existed for hundreds of millions of years (almost the reverse of the best-known brand of Judeo-Christian creationism with its very short chronology). The most familiar manifestation of Vedantic creationism

is Cremo and Thompson 1996 (archaeology and palaeoanthropology); for a critical review, see Brass 2003. Books in this tradition that deal with more recent history uphold the traditional Hindu belief that India was the center of Asia's (or Earth's) oldest civilization, with culture diffusing from there in early historic times. These notions have a nationalistic and religious appeal for some Indians.

A common theme in this tradition involves the Sanskrit language, in which the Vedas (the most venerated Hindu scriptures) were written. The orthodox position is that Sanskrit was brought into India around 3,500 years ago, as part of the European/West-Asiatic diffusion of the Indo-European language family from a base somewhere near the Black and the Caspian Seas (which occurred around 5,000–6,000 years ago). There is a serious case for the contrary view that the language was in India rather earlier and is perhaps represented by the undeciphered Indus Valley Script (see, e.g., Bryant 2001), though most of the linguistic evidence supports the standard view. (A generally accepted decipherment of this script—as representing Dravidian, Indo-European, or another language family again—would be a very important factor in the resolution of this issue.) However, there is also a more extreme Indian tradition (see, e.g., Sethna 1992) upholding the truth of legends interpreted as placing Sanskrit in India much earlier (7,000–8,000 years ago, sometimes still earlier). Indeed, Sanskrit is said to be much closer to Proto-Indo-European than is thought by modern historical linguists, and, in fact, the usual fringe Indian claim is that Indo-European actually originated in India and spread westward. This extreme view is almost certainly wrong: it is clear that Sanskrit had undergone major changes of its own vis-à-vis Proto-Indo-European, and was especially close to it only in some respects.

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One recent manifestation of this belief system is seen in *Proof of Vedic Culture's Global Existence* (Knapp 2000). Knapp's book is considerably less scholarly than Sethna's; it is also more accessible outside India. Knapp himself is a convert to Hinduism and a fervent promoter of all these ideas. He argues that Vedic ideas, together with the Sanskrit language, were once spread all over the earth by a technologically advanced Hindu civilization that provided the impetus for civilizations from China to Peru. Proto-Indo-European—as distinct from Sanskrit—never existed. Indeed, Sanskrit is the ancestor not only of Indo-European but of *all* languages! At a detailed level, Knapp and his sources make extensive use of language data by way of support for their historical claims.

However, most of Knapp's linguistic claims are simply wrong. Like Mozeson, he proceeds by identifying superficial similarities between Sanskrit words on the one hand and words in other languages on the other, and deduces that the non-Sanskrit words are derived from the Sanskrit words (which he deplores; *corrupted* and *perverted* are among the terms he uses). Most of these equations are simply asserted as facts, with no supporting evidence. But, as with Mozeson, there is, in general, no reason to accept them. At best, they are undemonstrated and not especially plausible. And most of them are actually known to be invalid; the words in question are simply not connected and have established, unrelated etymologies. One example involves the name *Australia*, which is a known modern coining transparently based on Latin, where it would mean "southern" (land, etc). Knapp states that it is from Sanskrit *Astralaya*, meaning "land of missiles"; he suggests that the pilots of *vimanas* (flying vehicles reportedly used by Hindu gods, here interpreted as actual aircraft) practiced firing their missiles in Australia, thus creating the deserts! Once again, Knapp is proceeding as if the tradition of serious historical linguistic scholarship did not exist.

Knapp's work is not the most extreme manifestation of this fringe tradition; that distinction belongs to the work of G.D. Matlock. Matlock's book (2000) is about the diffusion of Hindu culture, the "true" basis of Hinduism, and many features of the Sanskrit language to groups such as the biblical Israelites, early Europeans (including the inhabitants of the British Isles), and Amerindians (especially those in the Southwest of the modern United States and in Mexico). His procedures are similar to Knapp's but "further out." He knows virtually no linguistics and shows himself to be a believer in various nonlinguistic fringe ideas (see Newbrook 2001 for a review of Matlock's material).

Knapp and Matlock draw much inspiration and many examples from P.N. Oak, a now elderly writer living in Pune, India. Oak (1992, 1995) attacks the accepted etymologies for hundreds of English and other non-Indian words, place names, etc., and proposes new Sanskrit etymologies—most of them ludicrous, both linguistically and historically. Like Knapp and Matlock, he gives no evidence for most of his etymologies, but merely invites readers to agree that they are obviously correct. Oak simply does not know enough about

the subject or about the history of any language other than Sanskrit. Even for Sanskrit, he uncritically adopts Vedic ideas about its vast antiquity: he thinks it was used in happy Hindu communities worldwide for "2,000 million years" [*sic*] until wicked Christians, scientists and such, subverted all this and rewrote history!

Other religious/quasi-religious groups with links to Hinduism, including some based in the West, also focus on Sanskrit. With aid from its supposed spiritual allies, the Aetherius Society (see www.aetherius.org) still forges ahead on its mission to save Earth from its extrasolar foes. It regards Sanskrit not merely as the ancestor of all human speech but as vastly ancient and the main *lingua franca* of a whole swathe of inhabited planets! Naturally, the Theosophical Society also focuses on Sanskrit; Blavatsky's ideas (Blavatsky 1982) on the language and on linguistics, which were strange and dated even in her own time, continue to command some respect in these circles.

There are also nonstandard linguistic ideas associated with other traditional religions, such as Australian Aboriginal and New Zealand Maori spirituality. In addition, there are further implausible claims along lines similar to those made in *Priesthood of the Ills* regarding the role of religious organizations in distorting the truth about linguistic history, e.g., the theory, promoted in Nyland 2001, that during the "Dark Ages," the Roman Catholic Church deliberately concocted most modern languages by distorting the Basque lexicon. But this is by no means the only way in which such nonstandard fringe claims can involve linguistics. Even as far as historical linguistics specifically is concerned, this article has done no more than scratch the surface.

The fringe literature is replete with weird claims about ancient languages and scripts, whether religion is involved or not. And there are also many books on the market which display misconceptions or errors of quite other kinds concerning language or particular languages, or which make implausible linguistic claims of many types. Elsewhere, I have discussed topics as varied as performances claimed to represent parts of channelled languages associated with UFO abductions, the view that almost all normal everyday speech contains unplanned linguistic reversals (as in "backward masking") that supposedly reveal speakers' inner thoughts, and many more. There is scope for much more investigative work on a plethora of such topics.

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The fringe literature is replete with weird claims about ancient languages and scripts, whether religion is involved or not.

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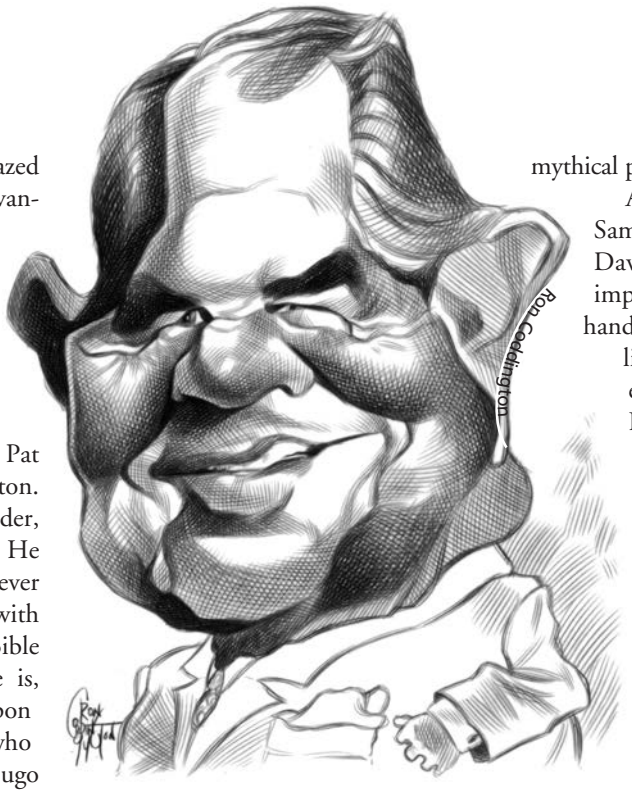
Pat Robertson's Secret Ingredient

STANLEY A. RICE



Like many people, I was amazed at the announcement by televangelist Pat Robertson that he could leg press a ton. At first, I thought this must be an error in converting English to metric units, but a ton (two thousand pounds) is almost the same as a tonne (one thousand kilograms).

So I was stuck with the fact that Pat Robertson can, indeed, leg press a ton. I did not consider, nor can I consider, that his information was inaccurate. He is a Christian evangelist, and they never lie, or even exaggerate; they stick with literal truth, when they read the Bible and when they speak. Indeed, he is, as he claims, God's spokesman upon the Earth; it was he, after all, who announced God's desire to see Hugo Chavez assassinated.

Robertson claimed that his power came from a special protein shake that he had invented that would stop the process of aging. He claims to have posted the recipe on his Web site, but you have to register to receive this information, something I was unwilling to do. Since Robertson considers the Bible to be the source of all knowledge, I figured that the secret ingredient for his protein shake must be there. Therefore, I decided to investigate biblical protein recipes.

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There are many biblical meat recipes in the Old Testament, for beef, lamb, and goat, and even a little-known passage in the Book of Acts, in which God instructs the apostle Peter to eat pork. But meat is not a good component for shakes. Then, I found Ezekiel 4:9, in which God instructs the prophet to subsist on bread for 390 days. This must be very nutritious bread. The flour contained not only grains (wheat, barley, millet, and spelt) but also legumes (beans and lentils), which are an excellent source of protein. In Daniel 1:8–16, we find that another prophet subsisted on beans and had excellent health as a result. But the mystery remained, since liberal vegetarians eat beans without coming anywhere close to Robertson's almost mythical prowess.

And then, I found it. In I Samuel 18:20–29, we read that David, not yet king, tried to impress King Saul and win the hand of Princess Michal. David's little band of warriors raided enemy villages and brought King Saul the foreskins of two hundred Philistines. This must be the secret, magical protein ingredient: foreskins.

This is just one example of the many ways in which modern science can benefit from biblical insights. Obviously, evolution has to go. But medical science can benefit from the Bible also. In I Chronicles 21:14–16, we read that there was a plague in Judah that killed seventy thousand men and that it was caused by an angel sent from God, whom David literally beheld over the threshing floor of Ornan the Jebusite. In the four gospels, Jesus healed many people; and in about half of the cases, the healing involved the expulsion of one or more demons. It is widely accepted by conservatives that intelligent design should be taught alongside evolution; but it is obvious that demonology should be taught alongside physiology, and that, as Pat Robertson has shown us, biblical recipes should substitute for scientific studies in nutrition. The biblical literalist restructuring of science has only just begun.

For the God Question, a Biological Perspective

KENDRICK FRAZIER

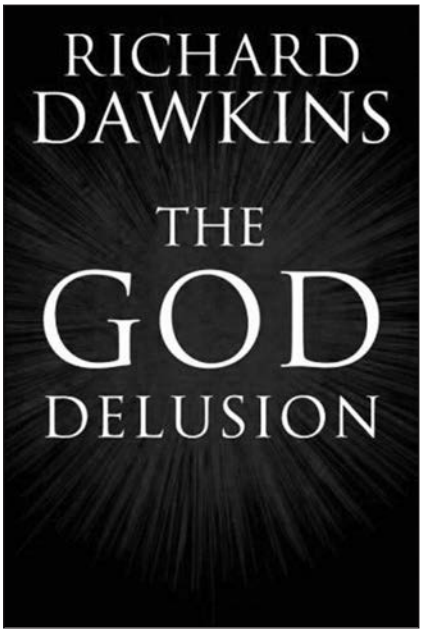
The God Delusion. By Richard Dawkins. Houghton Mifflin, Boston, New York, 2006. ISBN-13: 978-0-618-68000-9. 406 pp. Hardcover, $27.

That a book so forthrightly titled (no subtitle necessary!) and forcefully argued as *The God Delusion* could reach and make an extended stay on the upper strata of the best seller lists over the past months may tell us something about a shifting cultural climate. It may be a changing *Zeitgeist* (a term the author employs late in his book for just such welcome raisings of consciousness) to counter the excesses of those who have aggressively pushed a narrow religious agenda upon the mainstream.

The book's success certainly tells us something about the unique abilities of its author, Richard Dawkins. Dawkins, who has made his name as a distinguished biologist and literate explainer and defender of evolution, is, as a public person, also legitimately deserving of his publisher's moniker as "the world's most prominent atheist."

The two—scientist and atheist—don't necessarily go hand in hand, but Dawkins here meshes his scientific knowledge and scientific worldview with a welcome freshness and directness in examining all aspects of the "god" question, a matter often treated with kid gloves and a philosophical abstruseness intended, if not to be understood, at least not to offend. Dawkins works very hard to be understood, bringing his considerable knowledge, insight, and clarity of expression to his cause.

Dawkins also hopes not to offend—I think he really does try to couch his



arguments to appeal to the higher impulses of intelligent believers. But not giving offense is not the highest item on his agenda. In fact, society's "hands-off" attitude toward religion, an "undeserved respect" by which generations of people have been raised to give religion a free pass, allowing it to avoid the no-holds-barred critical scrutiny all democratic societies apply toward politics and everything else, is one of the things Dawkins very much wants to change.

"I am intrigued and mystified by the disproportionate privileging of religion in our otherwise secular societies. . . . What is so special about religion that we grant it such uniquely privileged respect?"

A number of other such big consciousness-raising themes resound throughout these pages.

1. Atheism can no longer be marginalized and ignored. It is a respected intellectual tradition. Atheists and agnostics far outnumber Jews and even most other religious groups. Dawkins hopes to raise the consciousness of people who have had religion pushed on them and wish they could leave that tradition: "To be an atheist is a realistic aspiration, and a brave and splendid one," he writes. "You can be an atheist who is happy, balanced, moral, and intellectually fulfilled."

2. The God hypothesis is a scientific question, one that can, in principle at least, be answered empirically with a yes or no result. The existence of God is thus subject to legitimate scientific scrutiny, bringing to bear all we are learning in the research laboratory to a question that used to be considered one of opinion only. "The presence or absence of a creative super-intelligence is unequivocally a scientifically question, even if it is not in practice—not yet—a decided one," he writes. Did Jesus have a human father? Was his mother a virgin? Did Jesus come alive again, three days after being dead? "There is an answer to every such question, whether or not we can discover it in practice, and it is strictly a scientific answer."

Kendrick Frazier is editor of the SKEPTICAL INQUIRER.

3. Evolution by natural selection is the creative force that provides all the biological complexity we see on Earth. This "illusion of design" fools those unfamiliar with evolution (the majority of people, unfortunately) into thinking a master designer must be at work. Biologists know that no such hypothesis is needed.

4. Arguments for God's existence all have pungent counterarguments. Dawkins himself spends some time on a number of them: The Argument from Beauty, The Argument from Personal "Experience" (the most convincing to those who have had one, "the least convincing to anyone else, and to anyone knowledgeable about psychology"), The Argument from Scripture, The Argument from Admired Religious Scientists, Pascal's Wager, and Bayesian Arguments.

He has fresh things to say about all such arguments. How do you account for inspired works of art, the religious mind asks? Answers Dawkins: "Beethoven's late quartets are sublime. So are Shakespeare's sonnets. They are sublime if God is there and they are sublime if he isn't. They do not prove the existence of God; they prove the existence of Beethoven and Shakespeare." "Visions" and other personal experiences of God seem astonishing to the beholder, but "the formidable power of the brain's simulation software . . . is well capable of constructing 'visions' and 'visitations' of the utmost veridical power." He cites data showing that an overwhelming majority of members of the National Academy of Sciences and Fellows of the Royal Society are atheists. So much for admired scientists sharing the religious sensibility.

As for scripture, which means so much to so many, Dawkins cites chapter and verse of utter contradictions and the calls to violence and child-abuse and murder and wonders if religious people have even read the book they admire so highly. Even so, it doesn't really matter. "Although Jesus probably existed, reputable biblical scholars do not in general regard the New Testament (and obviously not the Old Testament) as a reliable record of what actually happened in history, and I shall not consider the Bible further as evidence for any kind of deity." He quotes the "farsighted words" of Thomas Jefferson, who wrote to John Adams, "The day will come when the mystical generation of Jesus, by the Supreme Being as his father, in the womb of a virgin, will be classed with the fable of the generation of Minerva in the brain of Jupiter." (One of his subthemes is that the founding fathers of the American republic were not the "Christians" imagined by today's religious right but something very close to deists, agnostics, or, yes, even atheists.)

Dawkins saves his biggest guns for the most powerful argument of all, one that doesn't depend upon personal subjectivity: The Argument from Improbability. Some observed phenomena about life is correctly extolled as statistically improbable. Theists think the argument falls in their favor. Dawkins sees exactly the opposite. The argument, in his view, "comes close to proving that God does *not* exist."

In a core chapter "Why There Is Almost Certainly No God," he calls the argument the Ultimate Boeing 747 gambit. This is reference to the amusing image attributed to the physicist Fred Hoyle. Hoyle said the probability of life originating on Earth is no greater than the chance that a hurricane, sweeping through a scrapyard, would assemble a 747 airliner. It is the creationist's favorite argument, and it seems powerful to those uninformed by natural selection. This is where Dawkins finds that biologists seem to have something up on some physicists who may understand natural selection intellectually but apparently not viscerally. Suggests he: "Perhaps you need to be steeped in natural selection, immersed in it, swim about in it, before you can truly appreciate its power."

The argument, Dawkins says, "could be made only by somebody who doesn't understand the first thing about natural selection: somebody who thinks natural selection is a theory of chance whereas—in the relevant sense of chance—it is the opposite." In fact, as he sets out to show in the chapter (I think successfully), "Darwinian natural selection is the only known solution to the otherwise unanswerable riddle of where the information content [in living matter] comes from."

The insights of evolution make biologists wary of the way that the idea of chance is so often misinterpreted. "A deep understanding of Darwinism teaches us to be wary of the easy assumption that design is the only alternative to chance, and teaches us to seek out graded ramps of slowly increasing complexity," writes Dawkins. "The illusion of design is a trap that has caught us before, and Darwin should have immunized us by raising our consciousness. Would that he had succeeded with all of us."

He notes that the "scientifically savvy" philosopher Daniel Dennett has pointed out that evolution counters one of the oldest ideas we have: "the idea that it takes a big fancy smart thing to make a lesser thing. . . . You'll never see a pot making a potter." But as Dawkins points out over and over throughout this book, the incremental processes of evolution through natural selection do just that. "Darwin's discovery of a workable process that does that very counter-intuitive thing is what makes his contribution to human thought so revolutionary, and so loaded with the power to raise consciousness."

Again Dawkins clearly summarizes the point: "Chance and design both fail as solutions to the problem of statistical improbability, because one of them is the problem, and the other one regresses to it. Natural selection is a real solution. It is the only workable solution that has ever been suggested. And it is not only a workable solution, it is a solution of stunning elegance and power."

Along the way Dawkins brings a biologist's unique perspective to some pesky problems, such as the anthropic principle. Physicists seem to get tied up in knots writing about the anthropic principle, perhaps fearing that it pro-

vides fodder for the design hypothesis for the universe. The idea that the universe is apparently finely tuned for life as we know it (us) to exist—six constants have to be pretty much "just so"—is loved by what Dawkins calls "religious apologists," a fact he finds strange. "For some reason that makes no sense at all, they think it supports their case," he writes. "Precisely the opposite is true. The anthropic principle, like natural section, is an *alternative* to the design hypothesis. It provides a rational, design-free explanation for the fact that we find ourselves in a situation propitious to our existence."

The anthropic idea—more or less that if the conditions weren't right we wouldn't be here to speculate about it—"has a faintly Darwinian feel," Dawkins finds.

"What the religious mind fails to grasp," he writes, "is that two candidate solutions are offered to the problem. God is one. The anthropic principle is the other. They are *alternatives*."

The God solution seems deeply unsatisfying. "A God capable of calculating the Goldilocks values for the six numbers would have to be at least as improbable as the finely tuned combination of numbers itself, and that's very improbable indeed." He calls it the "Divine Knob-Twiddler" argument, and again sees that our tendency to resort to it "may have something to do with the fact that many people have not had their consciousness raised, as biologists have, by natural selection and its power to tame improbability."

I found on every page of *The God Delusion* passages worth underlining that I want to turn to again and again. Dawkins has created here something not just for the nonreligious and those leaning that way—a powerful call for the respectability and intellectual validity of nonbelief—but a book also full of substance for any scientifically inclined reader. It repeatedly calls forth the powers of natural selection to provide understanding and insight into a natural world that deserves our highest and

A Renewal of Sagan's Voice on Science, Religion, and Survival

LAUREN BECKER

The Varieties of Scientific Experience: A Personal View of the Search for God. Carl Sagan. Edited by Ann Druyan. Penguin Press, New York, 2006. ISBN 1-59420-107-2. 284 pp. Hardcover, $27.95.

In 1984, researchers at Yale discovered thirty new Bach organ preludes among eighty-two previously catalogued chorales. For classical music fans, the discovery was a thrilling opportunity to experience new music from a master composer who had stopped creating works long ago. This is part of the tragedy of losing great people: while we certainly miss their company, their presence, there is also a profound mourning for the loss of their ideas and the contributions they would have made had they been with us longer. The discovery of long lost creations not only adds new gifts to our lives, it allows us the joy of reuniting, at least temporarily, with the person we so dearly miss.

For fans of Carl Sagan, *The Varieties of Scientific Experience* is just such a discovery. In 1985, Sagan was invited to Scotland to give the prestigious Gifford Lectures, a series of talks established in 1885 by Adam Lord Gifford and dedicated to the topic of natural religion. The Gifford Lectures discussed natural theology as a science, that is, "without reference to or reliance upon any supposed special exceptional or so-called miraculous revelation." Over the course of fifteen days, Sagan presented ten lectures to overflow audiences.

Now, to mark the tenth anniversary of his death, Ann Druyan, his widow and long-time collaborator, has edited and published the transcripts of those lectures and given us a chance to hear Sagan speak anew about science, skepticism, and his personal view of the search for god.

"I would like to tell you something of my views on what at least used to be called natural theology, which, as I understand it, is everything about the world not supplied by revelation." Thus began a delightful tour through Sagan's cosmos, a "reconnaissance of Heaven." In three whirlwind lectures, he set the natural stage and laid out humanity's tiny little place in an immense universe. This is what Sagan did best—it's what captured our hearts and minds in his 1980 PBS series, *Cosmos*, and it is just as much fun to relive in a book now, complete with color plates similar to those he used in the original lecture.

He continued, "This vast number of worlds, the enormous scale of the universe, in my view has been taken into account, even superficially, in virtually no religion, and especially no Western religions." This was a Sagan-esque ding at natural theology and the Gifford audience. After all, how could theology be natural if it didn't acknowledge the condition of nature?

While many had tried to show that science and religion were not only compatible but complementary, Sagan took several opportunities in his first lectures to remind his audience of the long history of conflict between the two. Discovery after scientific discovery had contradicted church doctrine, assaulted

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"human vainglory," and forced theologians to deny natural truths, many of which were still being denied. In other words, the attempt to reconcile science and religion was polite, but it was not supported by the evidence.

Sagan was well equipped to deal with the conflict between science and religion because, unlike many other science advocates, he understood that the issue is a matter of emotion more than a matter of facts. Each side always thinks they have evidence for their claims, but emotions cloud judgment and make it difficult to separate wishes from reality.

This is not to say, of course, that there weren't a few crazy ideas out there, too, and here Sagan performed a neat trick. If the idea of natural theology was to find natural evidence to support supernatural beliefs (yes, that's an oxymoron), it had to come back to evidence. What was the difference between good evidence, bad evidence, and no evidence at all? In a Gifford Lecture hall, "evidence for God" was a tricky subject and too emotionally loaded to use for a casual lesson about "evidence," so Sagan took a different path. He eased into the discussion of evidence for god by first talking about evidence for UFOs and ETs, two subjects that excited him emotionally, but that didn't immediately threaten his audience. Two subjects that also, incidentally, offered numerous clear examples of bad and nonexistent evidence. It was a subtle lead: First we're going to talk about some dubious beliefs so you know how to recognize them, then I'm going to tell you about yours.

Sagan waited until his sixth lecture to directly tackle the "God Hypothesis" and then he approached it like any good communicator would. First, he defined terms. What did they mean by the word *god*? "The range of hypotheses that are seriously covered under the rubric 'God' is immense." Once that was addressed, he gave a summary of what had been the standard "natural" evidences (proofs) for god and then clearly and efficiently gave the reasons they ultimately fell short. In just thirteen pages, Sagan reduced 100 years of Gifford Lectures to, "I therefore conclude that the alleged natural theological arguments for the existence of God, the sort we're talking about, simply are not very compelling. But they are trotting after the emotions, hoping to keep up. They do not provide any satisfactory argument on their own." And there you have it. But what about the rest of the lectures?

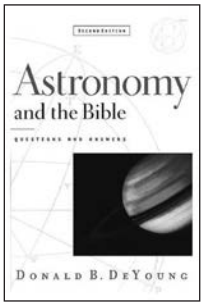
Now that he had shown there was no natural evidence for god, Sagan continued the discussion by explaining how there might be natural reasons for religion. After all, god and religion were not the same thing. For religious thought to be so prevalent across so many cultures and eras, Sagan argued, there must be *something* beneficial about it. The question was, "beneficial to whom?" And how do we recognize the positive aspects among the detrimental aspects?

"If we have such an emotional stake in the answers, if we want badly to believe, and if it is important to know the truth, then nothing other than a committed skeptical scrutiny is required." In other words, how good is your evidence? Using another of his favorite analogies, Sagan reminded his audience of buying a used car. "When you buy a used car, it is insufficient to remember that you badly need a car. . . . It is insufficient to say the used-car salesman is a friendly fellow." You have to kick the tires, look at the odometer, and check under the hood. If people do this for something as unimportant as an automobile, he insisted, shouldn't they apply equal skeptical scrutiny to issues of ethics, morals, transcendence, and the nature of human beings?

Here we must remember the time frame of Sagan's lectures. When he gave these talks in 1985, the United States and the Soviet Union were at the height of the Cold War. President Reagan had created the Strategic Defense Initiative ("Star Wars") and the Soviets were conducting nuclear tests. Both sides had enough nuclear warheads to destroy every major city in the world ten times over. Religious leaders were calling on the country to fight the godless communists, but scientific leaders—especially Sagan—were calling on all parties to stand down because the scientific evidence showed clearly that a nuclear war would devastate the entire planet, not just the opposing side.

Throughout each lecture, there was the prevailing sense that this was what Sagan was really worried about. Not the existence of god, not even the existence of religion, but the very real possibility that we were about to destroy our species. He knew we had an extremely urgent problem. "Since the times are extraordinary, since they are unprecedented, it is in no way clear that ancient prescriptions retain perfect validity today." If we couldn't consider new alternatives, we ran the danger of "fighting to the death on ideological pretexts." Scientific discoveries of the past 200 years had shown that extinction was the rule for life on Earth. Survival was the exception. "No species was guaranteed tenure on this planet." Though religion had once helped our ancestors, Sagan understood that science, skepticism, and critical inquiry led to the best evidence, the most reliable information that we would need to keep from destroying ourselves. Ultimately, he used his Gifford Lectures as a call to action, a call to stop worrying about god's existence and to start worrying about our own.

For Sagan's longtime students, *The Varieties of Scientific Experience* offers little in the way of new *thought*, but it is a much needed renewal of Sagan's *voice*, as only a lecture could be. The players have changed since 1985, but our differences continue to block out our similarities. Sagan's warning still rings true. "We run the danger of fighting to the death on ideological pretexts." What better way to commemorate this great scientist than to revisit his voice, reminding us of the importance of good evidence and good communication, reminding us of the wonder of the cosmos and the precarious condition of



Counterproductive Mix of Science and Theology

WILLIAM D. STANSFIELD

Astronomy and the Bible—Questions and Answers. Second ed. By Donald B. DeYoung. Baker Books, Grand Rapids, Michigan, 2000. ISBN 0-8010-6225-X. 176 pp. Softcover, $12.99.

Astronomy and the Bible—Questions and Answers consists of 176 pages of 110 questions and answers, followed by a list of ten "Suggested Resources for Astronomy and Creation" and five "Internet Resources." There is also a glossary, scripture index, and subject index. The book is an "attempt to bring some balance to astronomy by presenting a Christian perspective" (13) and is "intended as a resource for the classroom and home." Although DeYoung is a Christian, his fundamentalist philosophical position does not represent the bulk of Christians of all denominations. DeYoung states, "Literal creation days and a young age for the universe are also promoted because I believe this view is true to Scripture and science." He also claims that "When the Bible touches on scientific subjects, it is entirely accurate" (17).

Science does not rely on authoritarian documents (especially not religious ones) or propose that any of its literature is "entirely accurate." So in what sense is his methodology true to science? As for his credentials, "Don DeYoung holds a PhD in physics from Iowa State University and a Master of Divinity from Grace Seminary" (176). How can a person obtain a PhD in physics (or any other field of science) from a prestigious secular university while relying on a faith that is fundamentally anti-scientific?

Although DeYoung obviously does not believe either in the evolution of the universe (other than entropy/degeneration) or of life on Earth, his book does not equate a belief in organic evolution with Satanic forces and a decline in moral values as so many other fundamentalists have claimed. My main purpose here is to evaluate the accuracy of the facts presented by DeYoung, not to criticize his outre explanations for the facts according to his interpretations of the Bible.

DeYoung states, "Footnotes have purposely been omitted. Instead, references in the back are included for documentation of ideas and for further study." Thus, even if footnotes had been used, they apparently would not have provided a way to verify the evidence for his claims—for example, "[S]ome experiments indicate that the universe may be young, on the order of 10,000 years old" (98). DeYoung does not cite these experiments, and the scientists I have contacted are unaware of any such scientific evidence. Moreover, he states "Evidence shows that, at some point in history, radioactive decay was temporarily accelerated" (p. 139). Again, DeYoung provides no evidence: "If atoms were 'reprogrammed' in this way . . . an appearance of age may have been built into the universe."

He also writes that "[T]he entire life of a star is an aging process: main sequence □ red giant □ white dwarf" (84). Since DeYoung believes that all stars were instantaneously created on the fourth day of creation, they are all actually the same age, and there was no "embryonic" stage of star formation from nebulae. He maintains this position despite the fact that stars in various phases of formation throughout our galaxy have been independently documented by innumerable astronomers.

In discussing the anthropic principle, DeYoung says it "is a powerful argument that the universe was *designed*" (136). He claims that if protons were just 0.2 percent more massive they would decay into neutrons and there would be no atomic elements as we know them. Apparently he does not realize that if the proton was more massive, the neutron would be as well! Protons and neutrons are composed of quarks, so the author is changing the mass of quarks and he can't vary the proton without doing the same to the neutron.

In answer to the question, "Did a comet kill the dinosaurs?" the author cites the iridium layer at the Cretaceous boundary. This element "accompanies volcanic activity. The material does not necessarily come from beyond the Earth" (51). In fact, volcanoes do not pump out iridium and it is too rare on Earth to have formed the iridium-rich layer found worldwide in rocks of that age. DeYoung writes that "[C]reationists suggest that most dinosaurs died out as a result of the great flood of Genesis 6–8. Dinosaur representatives that were protected on the ark probably faced severe climate changes in the centuries following the flood, just a few thousand years ago" (51). In fact, all of the scientific data to date point to the disappearance of the dinosaurs from the fossil record at about 65 million years ago.

In fairness, the bulk of this book raises many basic questions about astronomy (e.g., What are meteorites? What makes up our solar system?) and usually gives standard answers that should be of interest to the general public. However, there are numerous factual errors and misinformation in the book, only a few of which I mention here because of space limitations. Readers of DeYoung's book may be left with the feeling that the "glory of God" cannot be fully appreciated unless the study of the universe is understood in terms of Biblical miracles (122). But this book is about the oldest branch of science—astronomy. So why are miracles proposed as solutions to astronomi-

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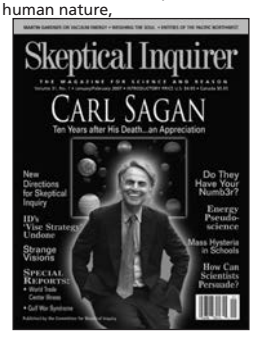
NOVEMBER/DECEMBER 2006 (vol. 30, no. 6): Special issue: Science + Art: The humanities and human nature, Pinker / Why we read fiction, Zunshine / View masters, Livingstone and Conway / Nature is nowhere rectangular, Tufte / String theory, Pickover / Sound: Not as simple as it sounds—An interview with Joshua Fineberg, Dacey / Creativity versus skepticism, Ramachandran / Special Report: Shame on shamus sham, Nickell / Siege of "little green men": The 1955 Kelly, Kentucky, incident, Nickell.



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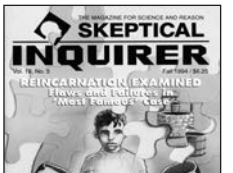

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cal questions when natural explanations are the only ones that science can give? Mixing theology and science in this way is counterproductive to the public's understanding of science. Therefore, readers should not use this book as their only source of information about astronomy. As a former educator in a secular university with a continuing interest in helping improve the quality of science education, I certainly would not want it to be used as a resource for the classroom.

This review benefited greatly from a critique by John Mottman, PhD, Physics Department, California Polytechnic State University, San Luis Obispo.

Intellectual and Creative Magnificence

KENNETH W. KRAUSE

What We Believe But Cannot Prove: Today's Leading Thinkers in the Age of Uncertainty. John Brockman, ed. (New York: HarperCollins, 2006) 252 pp. Softcover. $18.95.
ISBN 13:978-0-06-084181-2.

Those who wonder what cutting-edge scientists might ponder outside of their classrooms and laboratories need wonder no more. In *What We Believe But Cannot Prove*, "intellectuals in action" speculate on the frontiers of science, both hard and soft (p. ix). Skeptics, however, should not be deceived by the title. An ample majority of the more than 100 teasingly short essays included will sate the intellect's appetite for both facts and reasoned theory. John Brockman's new collection features the world's most celebrated and respected scientists and their musings on everything from human pre-history to cosmology and astrophysics, from evolution to extraterrestrial intelligence, and from genetics to theories of consciousness.

Biologist and geographer Jared Diamond is convinced, but says he cannot prove, that the first Americans and Australians arrived very recently, approximately 14,000 years ago and 46,000 years ago, respectively. Diamond's "guess" is based on archaeological evidence for such populations and on the fact that most large mammals on these distant continents disappeared shortly after such dates. When humans arrived in Australia and the Americas, he reasons, they easily slaughtered giant animals, the counterparts of which survived in Africa, Asia, and Europe largely because they were afforded the luxury of time, "millions of years to learn fear of human hunters, whose skills evolved slowly" (61).

But life is hardly unique to this world, according to *Discover* magazine editor Stephen Petranek, who predicts the detection of another Earthlike planet within ten years. Mars has disclosed evidence of a brackish sea and a frozen lake. The Milky Way nebula, Sagittarius B2, has revealed data suggesting the presence of aldehyde molecules that typically assist in the formation of amino acids. Scientists have reported their discovery of glycolaldehyde, a simple sugar. Astronomers have recently located smaller planets, more likely to be rocky than gaseous, orbiting sun-like stars, and copious amounts of water near and between stars. "[E]verything that life needs," Petranek writes, "is out there" (13).

Which is not to say that such life is or will ever be intelligent, warns physicist Kenneth W. Ford. While microbial life might indeed be common in our galaxy, "the existence of intelligent life . . . is another matter" (19). For lack of alternatives, take planet Earth, for example. Although microbes have flourished for 75 percent of terrestrial history, intelligent life has prospered for only 0.02 percent of that time.

Natural philosopher Paul C.W. Davies, on the other hand, seems more conflicted over the issue. Although he categorically rejects popular statistical arguments extrapolating on the enormous size of the universe alone and admits that "[n]o known law of physics or chemistry favors the emergence of the living state over other states," Davies nevertheless concludes that "we are not alone because life seems to be a fundamental, and not merely an incidental, property of nature" (17–18). If nothing else, the evidence seems to suggest that circular reasoning is every bit as common as intelligent life.

Drawing readers from the outlying back to the intimate, experimental psychologist Steven Pinker professes that human minds are richly mechanized and organized into focused cognitive systems. Cerebral homogeneity "is an illusion," he contends to his neuroscientist critics (121). Although the cortex may appear consistent, it might contain connectivity patterns and synaptic biases that facilitate different complex functions. To his geneticist detractors who remind us that the human genome probably contains as few as 25,000 genes, Pinker identifies a wealth of information contained in so-called junk DNA, the noncoding portions of the genome, "whose size, spacing, and composition could have large effects on how genes are expressed" (122).

Anti-abortionists and animal rights devotees might quarrel with philosopher

Kenneth W. Krause is a former prosecutor and criminal defense attorney with degrees in law, history, literature, and fine art. Books editor for Secular Nation, *he has recently contributed as well to* Free Inquiry, Skeptic, *SKEPTICAL INQUIRER, and* The Humanist.

Daniel Dennett, who proposes that an oral or sign language is prerequisite to consciousness, defined "in the strong sense of there being a subject, an I" (124). Neither young children nor animals are actually conscious, Dennett contends, because they own no past, because they have no ability to enjoy or suffer from their experiences. Evolution, unlike Walt Disney, Dennett notes, does not supply organisms with such unnecessary abilities.

Cognitive scientist Alison Gopnik argues instead that young children are actually *more* conscious than adults. Babies generally learn better, she observes, because as adults age, they typically "gain conductive efficiency but lose plasticity" (137). In other words, mature persons tend to either perform tasks habitually or focus on them single-mindedly. Although Gopnik initially claims to disagree with Dennett, she eventually appears to recognize that she has merely defined consciousness differently, in terms of external rather than internal awareness. "Babies," she finally confesses, "may be more conscious in one way and less in the other" (139).

Potential disputes over age-relative consciousness are apparently somewhat moot for psychologist and neuroscientist Robert R. Provine. "The argument," he contends, "is not that we lack consciousness but that we overestimate the conscious control of behavior" (145). When subjects are asked to explain their actions, they often confabulate, offering "post hoc misattributions" for such behavior, perhaps in efforts to either defend or promote themselves (146). By focusing on the issue of whether humans have any more conscious control over their actions than animals do, however, Provine tenders a hypothesis perhaps more appropriate to a discussion regarding the existence free will.

Some such essays are less helpful and inspiring than others, of course. Evolutionary biologist Richard Dawkins abruptly declares that Darwinian natural selection "is true all over the universe" (9). Physicist Lee Smolin argues that quantum mechanics is merely an "approximate description" and an unfinished theory (220). One wonders whether certain essays were included due to the contributor's station rather than the contribution's substance.

Regardless, *What We Believe But Cannot Prove* offers an impressive array of insights and challenges that will surely delight curious readers, generalists and specialists alike. Science is intimidating for the vast majority of us. But John Brockman has grown deservedly famous in recent years for his ability to lure these disciplines and their leading practitioners back to Earth where terrestrials are afforded all-too-rare opportunities to marvel at the intellectual and creative magnificence of science in particular,

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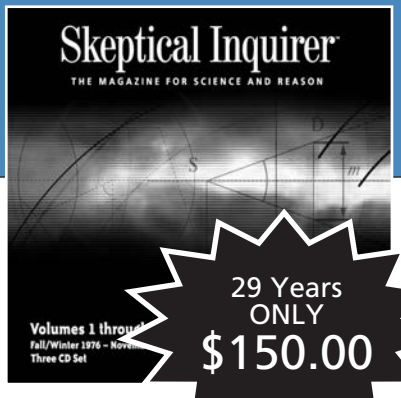

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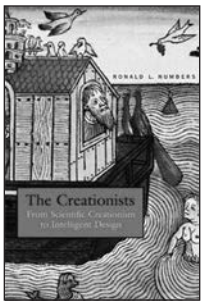
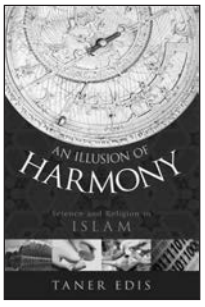
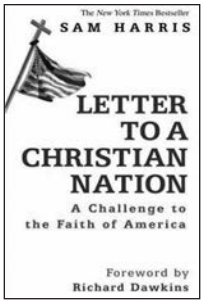


THE CREATIONISTS: From Scientific Creationism to Intelligent Design. Expanded Edition. Ronald L. Numbers. Harvard University Press, Cambridge, Mass., 2006. 606 pp. Softcover, $21.95. First published in 1992 and now recognized as a modern classic, this thorough history of the creationist movement has been republished here in an expanded edition. Numbers, professor of the history and philosophy of science at the University of Wisconsin, has updated the book with two extensive new chapters, one on intelligent design and another on the globalization of the creationist movement. The first chronicles the creationists' shift in strategy to emphasize ID and all the recent debates and cases about that; the second provides a valuable indicator of where creationists, long focused mainly in the U.S., are now putting increased emphasis—taking their message to the rest of the world.

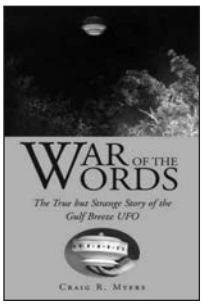


AN ILLUSION OF HARMONY: Science and Religion in Islam. Taner Edis. Prometheus Books, Amherst, New York, 2007. 250 pp. Hardcover, $28. Arguments in the West on the uneasy relationship between science and Judeo-Christian views of life are paralleled in the Muslim world regarding ways to integrate science with Islam. The author, a U.S. physics professor (Truman State University) born and raised in Turkey, examines the range of Muslim thinking about science and Islam, from blatantly pseudoscientific fantasies to comparatively sophisticated efforts to "Islamize" science. Along the way we encounter the world's strongest creationist movements and bizarre science-in-the-Qur'an apologetics. Edis examines all the conflicting trends, revealing the difficulties Muslim societies face trying to adapt to the modern technological world.



LETTER TO A CHRISTIAN NATION. Sam Harris. Knopf, New York, 2006. 98 pp. Hardcover, $16.95. The author of The End of Faith here addresses Christians in response to arguments they advance for their religious beliefs (many in hostile letters to him, citing biblical chapter and verse for their sometimes violent intolerance of criticism). Harris's purpose "is to arm secularists in our society, who believe that religion should be kept out of public policy, against their opponents on the Christian Right." In short sections like The Wisdom of the Bible ("Anyone who believes that the Bible offers the best guidance we have on questions of morality has some very strange ideas about either guidance or morality"), The Real Morality, Are Atheists Evil? The Power of Prophecy, The Clash of Science and Religion, The Fact of Life, and Religion and Violence, Harris succinctly answers those arguments. He laments "the failure of the media to criticize the abject religious certainties of our public figures." He ends "dumbstruck by the Muslim hoards who chant death to whole nations of the living" and also "dumbstruck by you as well—by your denial of a tangible reality, by the suffering you create in service to your religious myths, and by your attachment to an imaginary God."

* * *



WAR OF THE WORDS: The True but Strange Story of the Gulf Breeze UFO. Craig R. Myers. XLibris Corporation (Orders@Xlibris.com), 2006. 191 pp. Softcover, $17.84; hardcover, $27.89. In the late 1980s, a man named Ed Walters began releasing a series of thirty-eight UFO photos he claimed to have taken over twenty encounters in the Gulf Breeze, Florida, area, most with a Polaroid camera. This is a lively journalistic account by a reporter for the Pensacola [Florida] News Journal of the debunking of the photos, culminated by the discovery in the attic of the home Walters had lived in of a styrofoam model of a flying saucer matching the ones seen in many of the photos. As a reporter, Myers covered these events, becoming a debunker, and here, with the twentieth anniversary of the case approaching, describes the "war of words" the photos and claims provoked. As he says, quite accurately, "I went looking for the last word on the subject. I found a spaceship."

—Kendrick Frazier

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Science + Art Special Issue

I found your Science + Art issue (November/December 2006) very interesting and enjoyable. However, there is one element that I always wish to see in such a discussion, but do not. This would seem to fall, in the categories you listed, either in "art of science" or "science in art."

So much discussion of the relation between science and art ends up discussing robot- or algorithm-generated poetry or painting or of scientists themselves participating in such traditionally recognizable works of art. The Renaissance explodes with many examples of the latter.

My category would probably be called "science *as* art." The best I can do to describe it is to cite some examples. Think of Newton's *Principia*—the astonishing and profound appreciation of it rarely describes the book, itself, as "art."

As any computer scientist of the last few decades knows, *The Art of Computer Programming* by Donald Knuth shows just that—writing programs that are themselves works of art. As one of my thesis professors, David Matuszek, once said to me, "All of my programs are poems."

Another good discussion of this that comes to mind is from G.H. Hardy. He wrote about "elegance" in mathematics and proofs. It wasn't something that could be pinned down or defined, he said, but every mathematician recognizes it and strives for it. This is as nice a description of art as I can imagine.

I think it appeared in the elation and disappointment that received the proof, at last, of Fermat's "last theorem." Elation that it, at last, had been resolved, but disappointment that the proof did not appear in a more classical form, which Fermat's enigmatic marginal note undoubtedly pointed to (if, in fact, there really was one).

Elegance, in this case, is being raised to a much more rarified level, recognized only among mathematicians, of the much more sophisticated nature of modern proofs. We might call it the "modern art" of mathematical proofs. But, no doubt, many others are still searching for a classical proof and the classical painting or poetry that it is analogous to.

Undoubtedly, these forms of art in science have a somewhat small and exclusive audience, those who already recognize it from experience or observation with a highly trained eye. As the classic phrase regarding art goes, "I don't know what it is, but I know what I like." But I hope that it can emerge more in discussions in journals like your Science + Art issue, and expand both the audience and our understanding of the nature of this relationship between science and art.

Carl Gregory
Adjunct Professor, Computer Studies
Austin Community College
Austin, Texas

As I waited in a bookstore for my friend, a philosopher, to join me for coffee, I browsed the periodical section, focusing my attention in the science area. Which would it be, the latest issue of *Scientific American* or the journal that had suddenly caught my eye with its special issue on Science + Art? As an artist and poet who is crazy about science (and its practitioners), I picked up SI, but with some skepticism myself, having never before heard of your publication. When I leafed through it and saw that it contained one of my favorite poems, "Tsunami" by my friend Roald Hoffmann (who has an unrivaled ability to make science sexy), I made my choice.

My skepticism returned, however, when I read on page 39, that Galileo, by Edward Tufte's account (in "Nature Is Nowhere Rectangular") had traveled into the future (1690) to find the telescope that was to lead to the 1610 publication of *Sidereus Nuncius.* But then I reminded myself that, for the past two weeks, I had been receiving e-mail messages from tomorrow from my husband who is traveling in New Zealand. Still, 1609 is such a lovely date, as it is a prime number, and I adore prime numbers (shortly thereafter I told my delighted doctor that this was the only time that his children's ages, 3, 5, and 7, would all be prime numbers simultaneously). I brought the magazine home and read it cover to cover. It is not my wont to pick "favorites," so I won't (pun intended); instead, I will quote my sister's comments about my recent art show: "I like every single one best."

You may count me as a new subscriber.

Katherine Fishburn
Professor Emeritus
Department of English
Michigan State University

Thank you and welcome, and we apologize for the transposition in the date.—ED.

Steven Pinker's "The Humanities and Human Nature" (November/December 2006) was a fascinating read about how the occurrence of regular and irregular verbs in English is related to frequency of use. His examples in the article were correctly spelled, but the callouts "cleave, cloved" and "crow, crewed" were obviously a graphic designer's mistaken regularizing of the archaic but correct irregulars "clove" and "crew." As soon as I sawed them, I knew they were wrong.

Jerry Engelbach
Brooklyn, New York

I read the article "View Masters" in your Science + Art issue with great interest. While the theory set forth explores one possibility, I would like to offer an alternate hypothesis:

Artists that exhibit exceptional skill in rendering three-dimensional images on a two-dimensional surface do so because the artist's brain substitutes a three-dimensional neural reality construct in place of the physical, two-dimensional, drawing surface.

So instead of accurate representations of shading and perspective being the product of a stereoblind artist who has developed a greater sensitivity to the monocular depth cues necessary to more skillfully convey the technical illusion of spatial dimensions, I would suggest that the artist sees her canvas as encompassing the same three dimensions that we perceive in the real world.

I know this to be the case (anecdotally, anyway) from experience.

I, too, rely on the careful blend of shading, perspective, and occlusion to create the illusion of depth in my graphic-design work. And, while I am satisfied with the end result of my efforts, it has never been an easy pro-

cess for me.

That became less so when I had a deadline that kept me working on a project without sleep for over forty-eight straight hours, At hour forty-nine, the blue background of my Mac G4 Studio Monitor opened up to reveal a volume of shimmering blue just below the usual Mac desktop that was not unlike a swimming pool viewed from above.

Of course, I knew I was sleep deprived and loopy, but I never expected that, when I launched the graphic program that I use, I would no longer be drawing and filling with color. As I can best describe it, I was now sculpting. And the image responded as if it were a piece of clay. And what had never been easy to translate into two dimensions was now intuitive and natural. I no longer had to rely on two-dimensional cues. It was as if I were working in three dimensions!

It never occurred to me that what I lacked (quite literally) was the artist's vision.

Eight hours of sleep put an end to all this nonsense. My sight returned to normal, but the experience has left me with a much better understanding of what I had always assumed was a shared, collective perception of reality.

Dave Marks
San Francisco, California

Innovation in science, as in all fields, has always struggled against orthodoxy and conformism. But V.S. Ramachandran does the cause of science a disservice when he regurgitates the very postmodernist catechism he decries, by mislabeling orthodox conformism as "skepticism" (SI November/December 2006). Skepticism—the default position of doubt—has no hand in quashing creative hypothesizing in science, as it is a stance of doubt for old ideas as well as new ones.

As a creative musician who abandoned one graduate school for another because the former emphasized pseudoscientific "knowing things for certain" about music while denigrating the act of actually making music, I suspect that the same tendency is found far and wide in the world of scholarship and is not particular to science. The problem is not one of skepticism—healthy doubt—but of conformist orthodoxy, the pretense that scholarship has led to permanent edifices of absolute knowledge and that such knowledge is the only measure of ideas and creations.

I am skeptical of claims that skepticism has anything to do with conformist orthodoxy. Anecdotal experience has shown that getting skeptics to conform is like herding cats, though prior to Ramachandran's article, I've seen no strong claim one way or the other. If what Ramachandran is saying really is that skepticism causes orthodoxy, let's see clear definitions of the problem and some real evidence to support the hypothesis.

I'm afraid the use of *skeptical* in place of *conformist* in Ramachandran's writings has led him in a destructive direction, creating rhetoric that is easily misused by anti-science demogogues, when what he means to do is earnestly critique the sort of commercial, political, and sheerly pompous corruption that is endemic to all of academe.

Matthew H. Fields
Ann Arbor, Michigan

Science was not damaged by those who were "skeptical" of Semmelweiss's or Pasteur's germ theories; science was damaged by those who were dogmatic about the entrenched groupthink of the day. Skeptics didn't ignore bacterial transformation, dogmatists did.

V.S. Ramachandran's "cul-de-sac Skeptics" are not skeptics at all. They're dogmatists. A dogmatist will scoff at an outrageous hypothesis or ignore it altogether; a skeptic will develop protocols for testing it. Which requires creativity?

It's easy to be dogmatic, but skepticism requires effort, and most people are lazy, so they will choose dogmatism. Creativity has nothing to fear from skepticism, but their common enemy is dogmatism.

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Chiropractic: A Different Look

The review by Harriet A. Hall in the November/December 2006 SKEPTICAL INQUIRER ("Critical Chiropractor, Inept Publisher") suggests that a new, alternative model of nontraditional and complementary medicine is sorely needed by those who consider themselves the "scientific" watchers of chiropractic medicine.

For much of its life, chiropractic has been derided as everything from a faith-based cult to a back-door infiltration of medicine by the critics of mainline orthodoxy. Yet all of them—from the venerable Morris Fishbein, editor of the *Journal of the American Medical Association*, to the AMA's Committee on Quackery to Stephen Barrett—have failed to convince a knowledgeable public opinion that these assaults are anything but a response to a discipline that has grown through its independence from the orthodox mainstream.

The writing skills of dissident chiropractors who are acceptable to these critics may be but a case in point. Preston H. Long, with his recognized PhD, proved that he, too, could abandon critical thinking in accepting what appears to be a fringe vanity publisher with absolutely no proofreading protections. So much for degrees. Another chiropractor, Samuel Homola, DC, with traditional training from forty years ago (secondary school to four years prior to federal accreditation) can write paragraphs around Long and has the books to show for his literary accomplishments.

Unfortunately, neither of them has an audience other than the Barrett-sanctioned circle of "quack watchers," a pitiful gathering of obsessive chiropractic fearmongers whose "final solution" for the upstart healing school is simply elimination (repeal all chiropractic practice acts, force DC's to become physician's assistants or abandon healing altogether, and eliminate any Medicare or federal funding to their practitioners and schools).

True skeptics might recoil in astonishment at Hall's uncritical recitation of the three factors for patient outcome offered by Long: "whether the patient flosses regularly, whether he wears a seat belt consistently, and whether he enjoys his job." The millions of chronic-back-pain sufferers who enjoy work, floss, and wear their seat belts would like to know more.

From Fishbein to Barrett, chiropractic has grown to more than 60,000 practitioners with a third as many overseas. It is the second largest health profession, offering first provider services, and its schools are close to establishing four-year degree requirements for admission, as did osteopathy forty years ago.

It is time for Hall and others who may be frustrated "quack watchers" to look at chiropractors in a different way, and to look at their literature and research, which may well produce for them the evidence-based findings they stress. As a start, they might consider the many physicians—neurologists, orthopedists, and family-medicine specialists—who have embraced chiropractic at some cost to their own primary calling, as part of this rethinking.

Russell W. Gibbons
Pittsburgh, Pennsylvania

Harriet A. Hall replies:

Neither Long nor I think flossing, seat belts, and job satisfaction can prevent or cure back pain. I quoted his statement because I thought it was an amusing way of saying something obvious:

attitude can influence pain outcome.

Gibbons suggests that a new "model of nontraditional and complementary medicine" is needed. Why? What's wrong with the scientific method?

His defense of chiropractic seems to consist of these points:

(1) Chiropractic is embraced by the public.
(2) Chiropractic is growing.
(3) Its critics have failed to have much impact.
(4) Chiropractic education is becoming more rigorous.
(5) A review of the chiropractic literature "may well" produce evidence-based findings.
(6) Some physicians have embraced chiropractic.

You could say the same for astrology, but that doesn't mean astrology is a valid science.

Gibbons suggests that we look at the chiropractic literature and research: I've spent a great deal of time doing exactly that. I found that the chiropractic "subluxation" is a myth, that spinal-manipulation therapy (the kind also used by some physical therapists and physicians) helps some patients but gives no better long-term outcomes than other treatments, and that many of the other treatments offered by chiropractors are not supported by any acceptable evidence.

Gibbons has some harsh words to say about "quack watchers." I guess I'm one of those, but I stick to identifying quackery rather than offering "final solutions." Just for the record, I have been criticized by other "quack watchers" for saying there is a baby in chiropractic that shouldn't go out with the bathwater. I give a lecture that debunks the pseudoscience, covers both pros and cons, and concludes with advice on how to choose a safe chiropractor.

Noah Vale

The article "Searching to Noah Vale" by Benjamin Radford (November/December 2006) couldn't have come at a more opportune time. I am the host of "This Week in Atheism," a panel discussion on a public-access, cable-television show in New York City. Near the end of the summer, we commented on an article concerning Bob Cornuke's "discovery" of what he would very much like to be the real Noah's Ark in Iran. We mentioned that, in light of other claims that it had been seen in Turkey, the Ark must once again be on the move. In order to track its movement, we have initiated "ArkWatch," a segment during which we appeal to our viewers to immediately notify us if they have seen, among other things, Noah's Ark, Noah himself, indentations in the ground that could have been made by the ribs or keel of an ark, or if they have ever eaten a serving of ribs. I would like to extend that invitation to SKEPTICAL INQUIRER readers. They should please contact us at our Web site, www.centerforatheism.org, if they have seen, or can spell, "Noah's Ark" or think they might know someone who may have been married to, stood next to, or walked by someone who has or is willing to spring for an order of ribs.

Dennis Horvitz
Center for Atheism
New York City, New York

Ibero-American Conference

Although I am very pleased to see events such as the Ibero-American Conference on Critical Thinking being held in South America ("Latin American Conference Launches Federation of Centers," November/December 2006), I cannot avoid noticing with concern the extremely low representation of women among the organizers and speakers. There was not a single female among the nearly twenty speakers in Argentina last year, and only one among the twenty-five speakers who met last August in Peru.

Now, I am not the kind of person who goes around counting men and women, and I clearly do not expect that women will be represented equally in every aspect of life. However, I believe that the overwhelming disparity at these events has a potentially counterproductive effect. Latin American women will perceive the newly formed Ibero-American Federation of Centers of Inquiry as a boy's club, and this will further deepen the "male-logic/female-spirituality" dichotomy that we are all trying to fight.

Given that one of the goals of these meetings is to reach the public at large while promoting science and reason as a way of life, I would strongly suggest that the organizers of upcoming events look into inviting some of the numerous, highly qualified, female scientists who populate the best Latin American universities.

Marcia Levitus
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of Chemistry and
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Arizona State University
Tempe, Arizona

For the record, please note: the oldest university in the Western Hemisphere is the University of Santo Domingo in the Dominican Republic (founded in 1538), *not* San Marcos University, in Lima, Peru (founded in 1551).

Julio C. Núñez
New York City, New York

Predator Panic

Thank you for this piece of writing ("Predator Panic: A Closer Look," September/October 2006). Having just survived a three-year family ordeal resulting from an accusation by a sexually panicked and religiously paranoid kid, who falsely accused our barely fourteen-year-old daughter of a sexual "crime" at Girl Scout camp, I have vowed to spend the rest of my married, heterosexual, feminist life debunking this sex-offender crap.

I was lied to by cops and social workers with impunity, my daughter was coerced into taking two lie-detector tests (which, pathetically, she "passed") and then into fake "treatment," all to avoid a charge which the accuser could not have given credible testimony for. The alleged victim pointed the finger at the other girl simply to avoid being accused of homosexual tendencies and because she was confused. The cop filed the report and lost it for a year, until the mom screamed bloody murder after a multiple offender was let loose. The DAs are building their political careers on the backs of kids in these cases. It just goes to show you—most people don't think absurd crime laws affect them, but, sooner or later, they do. I have never felt so religiously or constitutionally violated in my life as when my husband and I (married for thirty years) were asked to fill out a questionnaire on our sex lives. This is so wrong. I am still mad about it.

Name withheld by request

Rewriting SETI History

In his latest attempt to rewrite SETI history (his answer in Letters to the Editor, September/October 2006), Peter Schenkel quotes Carl Sagan as claiming, "There are a million technical civilizations in the Galaxy." I do not recall Sagan making any such claim, and he certainly does not make it in the quotation Schenkel cites.

That quotation appears, as Schenkel

notes, on p. 166 of *Communication with Extraterrestrial Intelligence* (MIT Press, 1973), a book based on the transcript of a SETI conference held in Armenia in 1971. Sagan is illustrating the impact of making various estimates of the values in the Drake equation. He notes that if one adopts a large value for *L,* the typical lifetime of an extraterrestrial civilization, one gets a large estimate of the number of such civilizations existing in the galaxy at any given time. The full sentence, with the words that had been conveniently omitted by Schenkel restored, reads as follows: "The conclusion from our choice of numbers in [the Drake] equation would then be that $N \sim 10^6$; there are a million technical civilizations in the Galaxy."

In other words, if I may clarify what Schenkel takes such pains to obscure, Sagan is 1) demonstrating the sensitivity of the Drake equation to the value ascribed to *L* and 2) reminding his audience that 10^6 equals one million.

Sagan stresses that this is by no means the only plausible estimate one might make. "We are, of course, at liberty to put in any other numbers we want," he observes, cautioning his listeners that the many other uncertainties involved in the Drake equation "pale before our uncertainties in *L* (*op. cit.*, pp. 165, 166).

Schenkel imagines that he has "touched a sensitive chord" about SETI, "and that the time for a sober discussion and evaluation has arrived." Should he manage to get his facts straight, he will find that sober discussion and evaluation have graced this subject for decades, thanks to the scientists whose judicious contributions he first distorts and then endeavors to diminish.

Timothy Ferris
San Francisco, California

Pluto and Astrology

I'm in a quandary. The International Astrological Union downgraded Pluto to non-planet status. Even more horrifying is the potential, sometime in the future, for other planets being re- or declassified. Astrologers need to address this problem quickly, by answering the following questions, so that we can retain trust in their scientific advice.

1. What effect will this have on past and future horoscope accuracy?
2. Is the influence or noninfluence of a planet retroactive? Exactly when would past decisions become wrong?
3. If someone entered a business deal based on the position of the planets, will that deal go bad if the equation was based on the position of a body that really wasn't a planet? Could stock market profits be made by secretly polling the IAU voters to determine the outcome of planetary-status elections?
4. Should people reconsider the suitability of their marriage partners or of improper wedding dates?
5. If a new body is discovered and possibly meets planetary qualifications, would its influence on our lives begin immediately after its discovery, or would the influence have to wait for an IAU vote? How suddenly would we feel this effect?

These are important problems. Those "inquiring minds" who need astrology to help guide their lives may otherwise be destined to have to use reason for guidance, and our politicians who depend on astrology and on those with inquiring minds will perhaps be unable to keep hold of their power.

P.W. Marsh
Weare, New Hampshire

Stuff of Legends

I enjoyed reading about the late Ed Warren, demonologist (November/December 2006). It would appear that Ed Warren sought glory through the New England Society for Psychic Research. Here in Sacramento, we had a now-defunct group called S.P.I.T. (Sacramento Paranormal Investigative Team) that once investigated a home that was proclaimed by the team as "haunted." When others investigated, after the team's initial investigation, they discovered that the house was haunted—by rats in the attic. But people have short memories, and they will always remember the house being haunted; the house has become the stuff of legends.

Paul Dale Roberts
Elk Grove, California

Philosophy behind Pseudoscience

In responding to letters in the November/December 2006 issue, Mario Bunge claims that "all mental processes except for computations [are] non-algorithmic, that is, they are not performed consciously in accordance with precise rules." This is hardly a standard definition of algorithmic, and it's certainly not the definition used and understood by the correspondents to whom Bunge is responding.

More seriously, Bunge's definition would either declare computers conscious entities, which would be surprising, or entirely non-algorithmic, which would be incredible. Lest the objection be raised that computers use algorithms that were consciously scripted, a virtual neural network, run on a single-threaded processor using simple algorithms, can "learn" methods of problem solving that are unplanned by, and unknown to, any person.

I am not suggesting that all mental processes must be algorithmic, but merely that Bunge's definition sets up a rather un-lifelike straw man. He does so again, in refuting Bob Masta, by claiming that, because not all interesting political and other problems have been solved "by any person with a computer," creativity must be non-algorithmic. It seems Bunge includes "easy" as a necessary part of the definition of algorithmic, as if all computable problems were trivial.

Masta's well-reasoned letter deserved a more thoughtful response, not a repetition of the claim that since we are not consciously aware of certain rules governing our decision making, those rules must not exist.

Gary Grothman
Calgary, Alberta
Canada

The letters column is a forum for views on matters raised in previous issues. Letters should be no more than 225 words. Due to the volume of letters not all can be published. Address letters to Letters to the Editor, SKEPTICAL INQUIRER. Send by e-mail text (not as an attachment) to letters@csicop.org (include your name and address). Or mail to 944 Deer Drive NE, Albuquerque, NM 87122, or fax to 505-828-2080.

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